Surgery Review Part 1

By Mike, Jackson, Quinn

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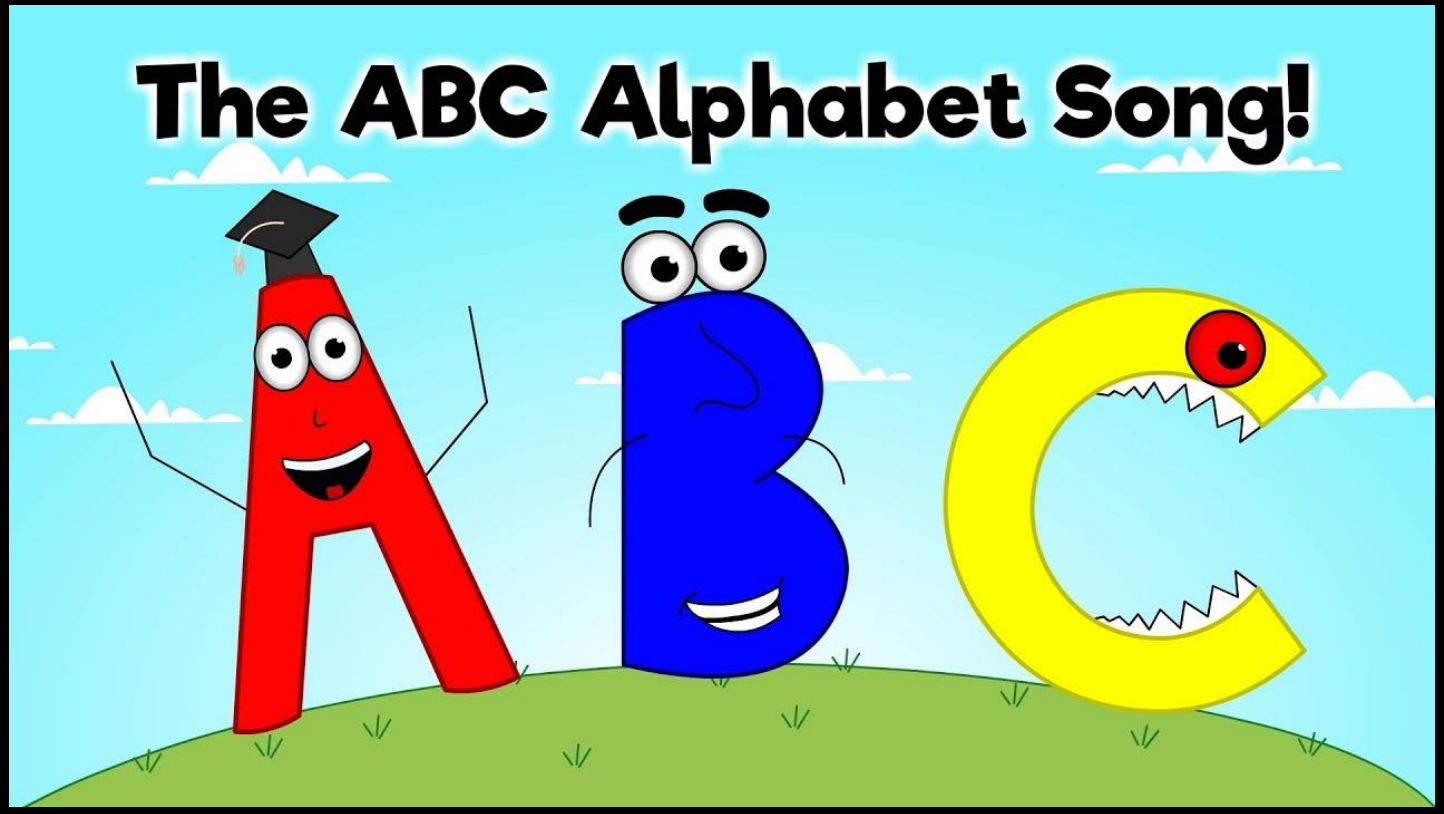
Trauma

What is the first thing to assess in a Trauma patient?

ABCs!



ABC (DE)

Airway

Breathing

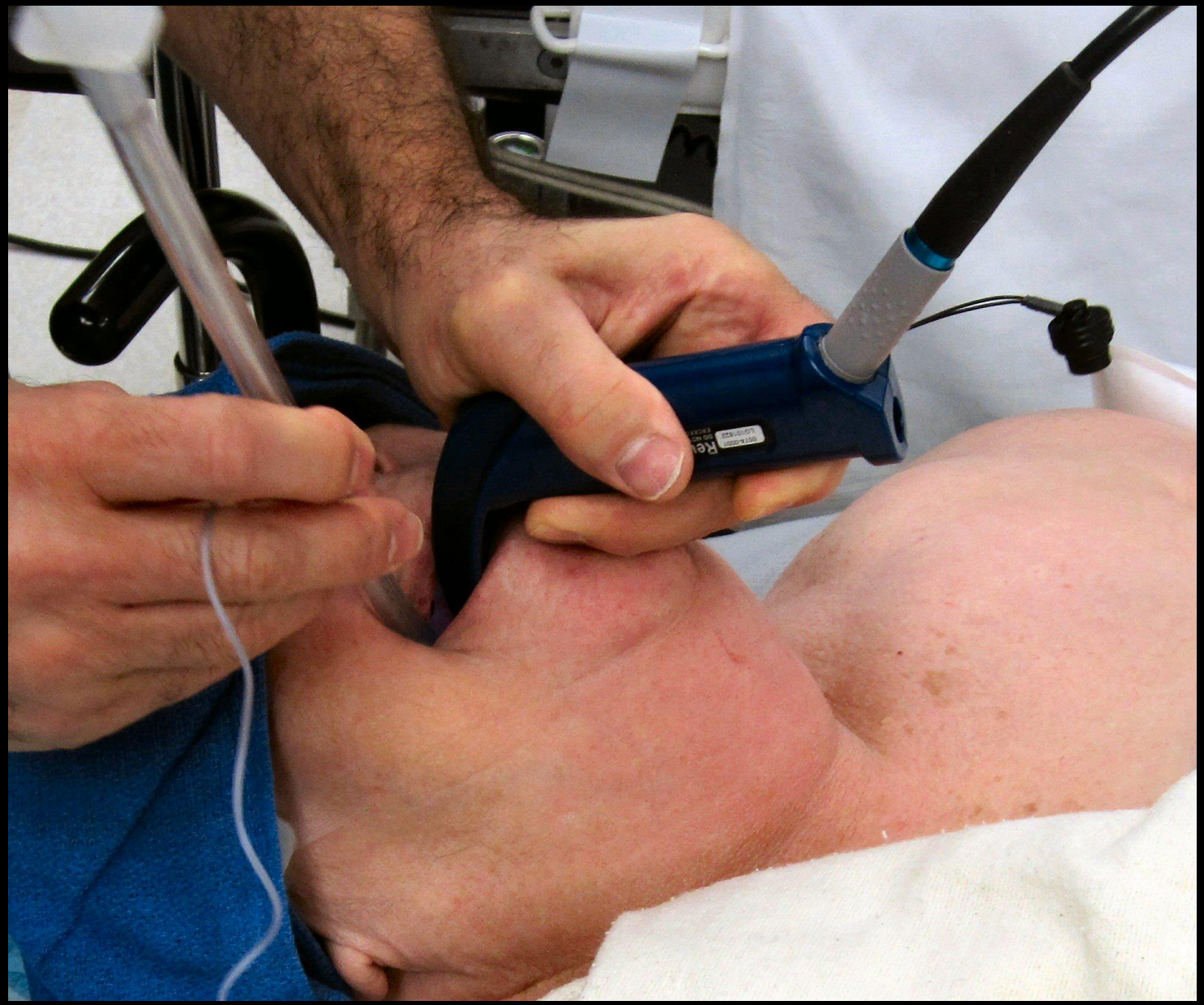
Circulation

Disability

Exposure

GCS score for intubation?

8 or lower (GCS is 8? INTUBATE!)



Own work by DiverDave (talk) (Transfered by PhilippN/Original uploaded by DiverDave), CC BY 3.0 <https://creativecommons.org/licenses/by/3.0>, via Wikimedia Commons

Glasgow Coma Scale

Eye Opening Response

- Spontaneous--open with blinking at baseline **4 points**
- To verbal stimuli, command, speech **3 points**
- To pain only (not applied to face) **2 points**
- No response **1 point**

Verbal Response

- Oriented **5 points**
- Confused conversation, but able to answer questions **4 points**
- Inappropriate words **3 points**
- Incomprehensible speech **2 points**
- No response **1 point**

Motor Response

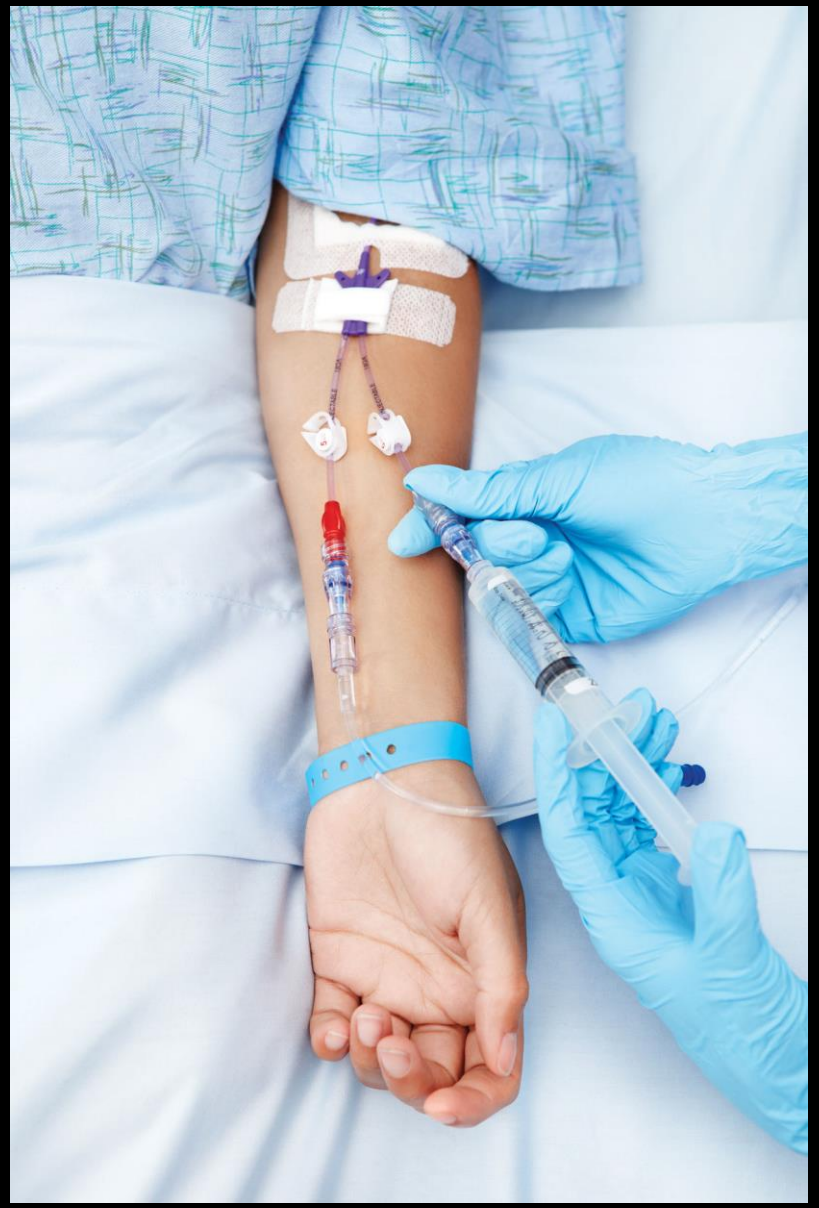
- Obeys commands for movement 6 points
- Purposeful movement to painful stimulus 5 points
- Withdraws in response to pain 4 points
- Flexion in response to pain (decorticate posturing) 3 points
- Extension response in response to pain (decerebrate posturing) 2 points
- No response 1 point

First line circulation access for patient with brisk blood loss (esophageal varices, trauma)?

2 large bore peripheral IVs

OR

Intraosseous line

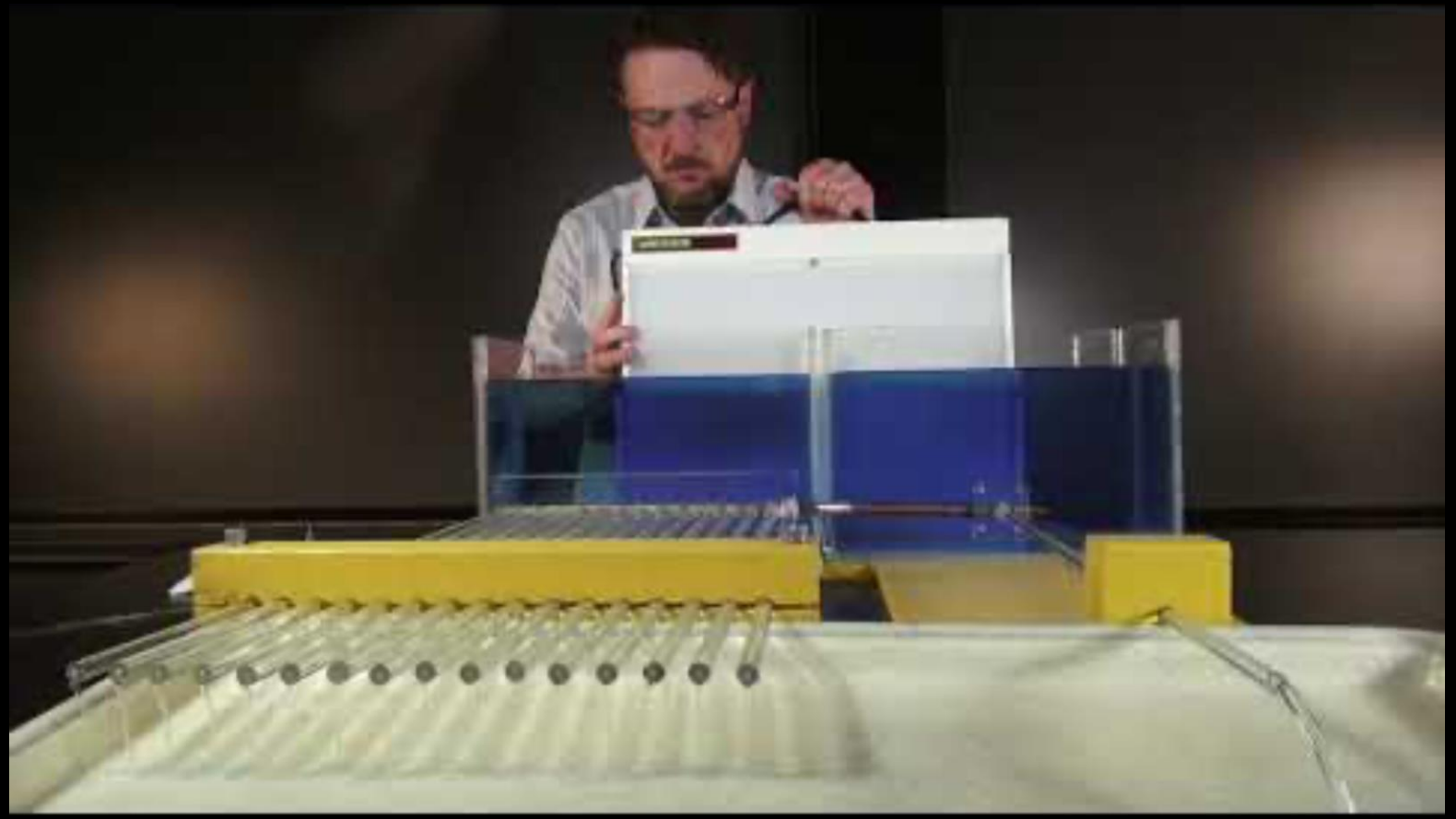


Calleamanecer, CC BY-SA 3.0 <https://creativecommons.org/licenses/by-sa/3.0>, via Wikimedia Commons

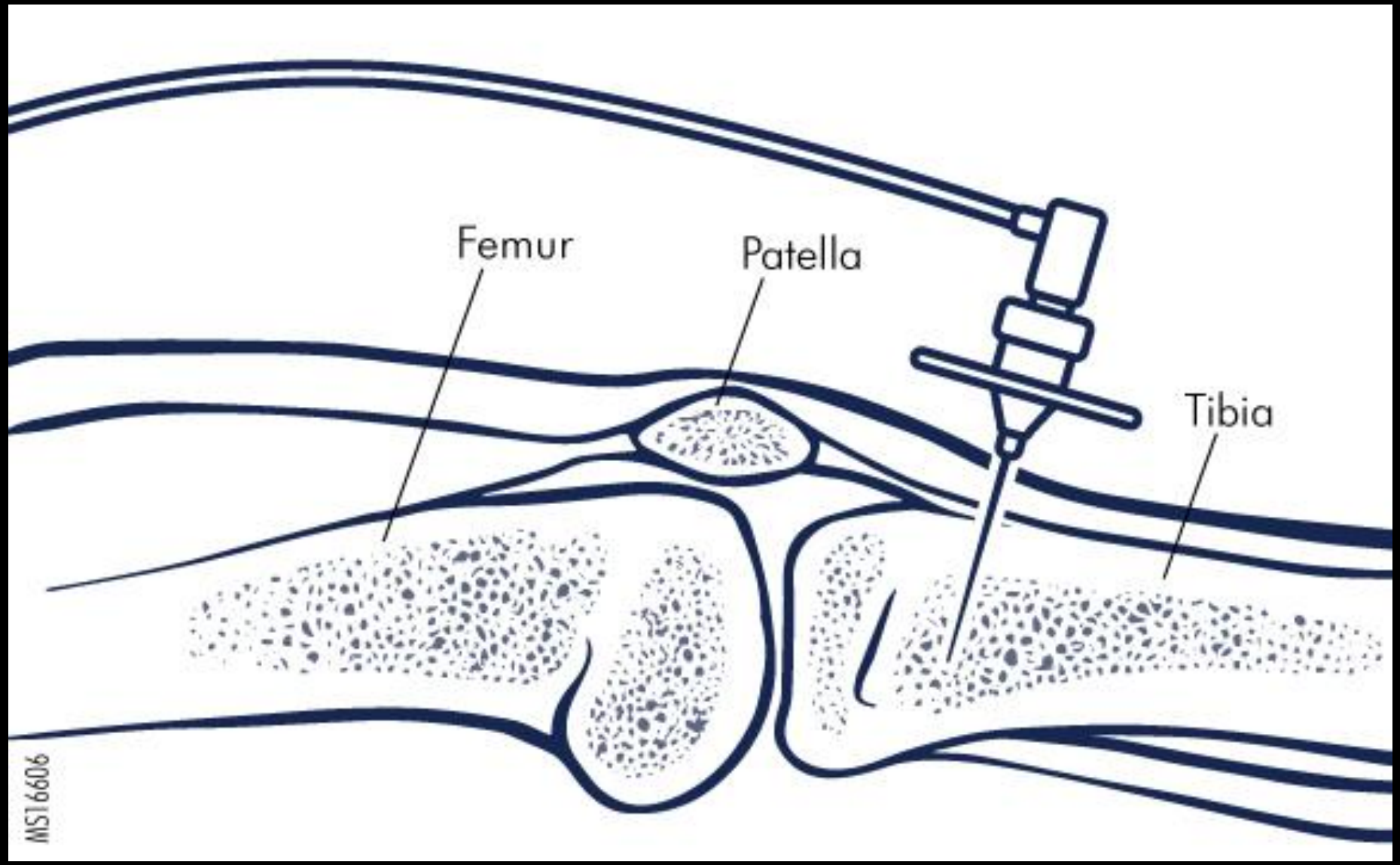
$$Q = \frac{\pi r^4 P}{8\eta L}$$

https://sciencedemonstrations.fas.harvard.edu/presentations/poiseuilles-law#:~:text=Poiseulle's%20law%20says%20that%20the,of%20radius%20r%20is%20clear.

Poiseuille's Law



https://www.youtube.com/watch?v=wn6eRMIOJ1k&t=163s



https://patientsafety.pa.gov/ADVISORIES/Pages/201609_114.aspx

Secondary Survey?

Head to toe physical exam to assess for injuries

Tertiary Survey? When?

Basically go back and perform a full exam again to ensure you didn't miss anything

Usually complete within 24 hrs

Gołofit P, Comminuted humeral shaft fracture. Case study, Radiopaedia.org (Accessed on 18 Oct 2024) https://doi.org/10.53347/rID-46128z

NECK BREAKER

https://de-law.com/posts/whiplash-after-a-car-accident-what-to-do/

Hervegirod at English Wikipedia, CC BY 3.0 <https://creativecommons.org/licenses/by/3.0>, via Wikimedia Commons

What if patient has head or neck trauma?

Cervical collar needed

What do you need to ensure to clear C-spine precautions?

No neck pain

No tenderness to palpation of midline C spine

Patient awake and alert

No intoxication

No distracting injuries

NEXUS Criteria-Neurologic deficit, spinal tenderness, AMS, Intoxication, distracting injury

Imaging study if patient has high likelihood of C spine injury?

Obtain CT

Can clear C-spine if negative

Why can respiratory status become compromised following high C-spine injury?

Diaphragmatic paralysis

Smith D, Left phrenic nerve palsy. Case study, Radiopaedia.org (Accessed on 18 Oct 2024) https://doi.org/10.53347/rID-37404

R. Shane Tubbs M.S. et al,
Journal of Neurosurgery

Patient presents with mastoid ecchymosis (Battle's sign), clear rhinorrhea, "raccoon eyes" (periorbital ecchymosis). Imaging?

Pt has mastoid ecchymosis (Battle's sign), clear rhinorrhea, "raccoon eyes" (periorbital ecchymosis)

Basilar skull fracture

What part of the skull is affected?

Petrous portion of temporal bone

Imaging?

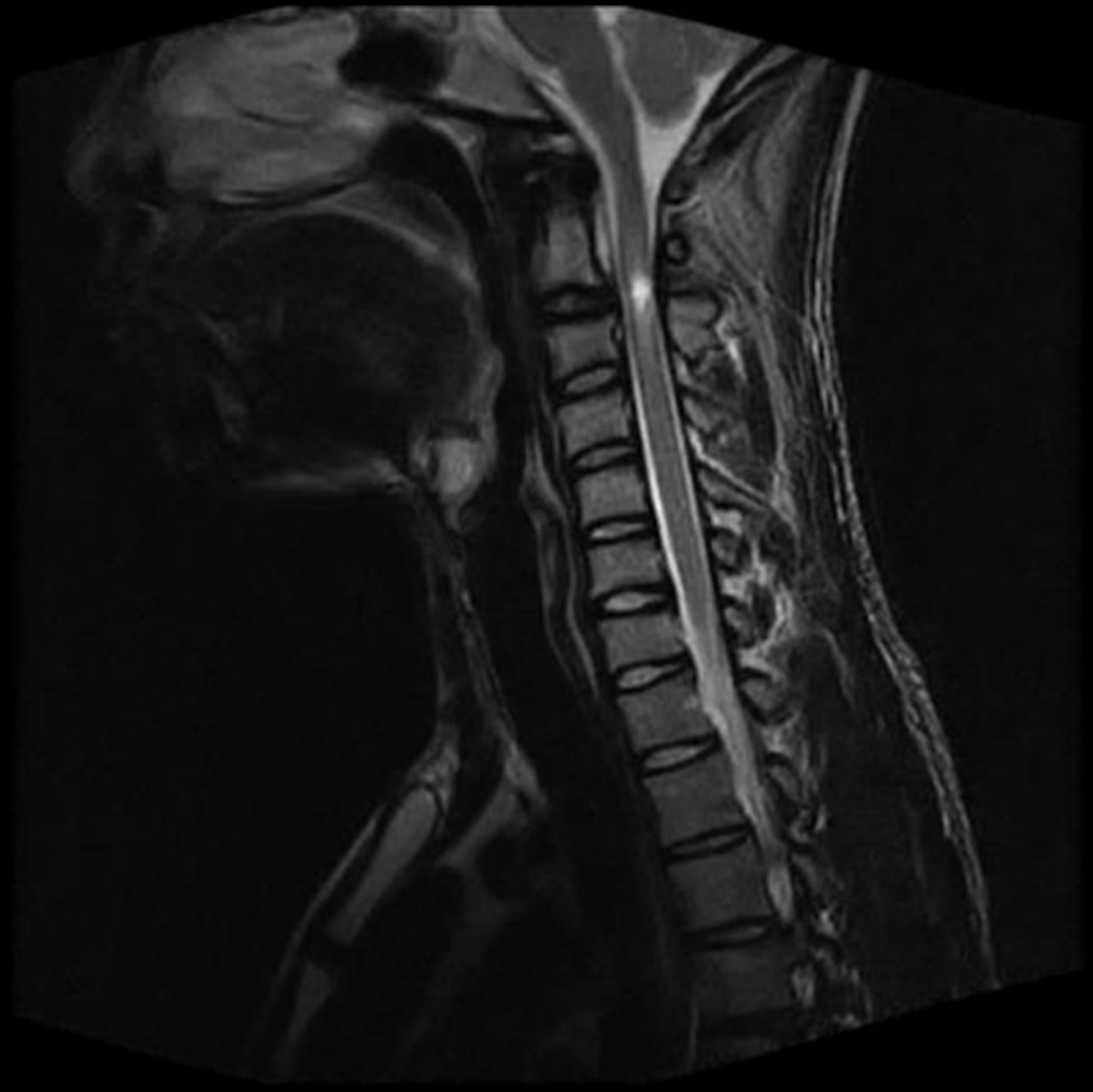
Cervical CT

Elderly patient with admitted following motor vehicle accident. Mechanism of injury was hyperextension of the neck. Now presenting with weakness of the bilateral upper extremities>lower extremities.

Central cord syndrome

Imaging?

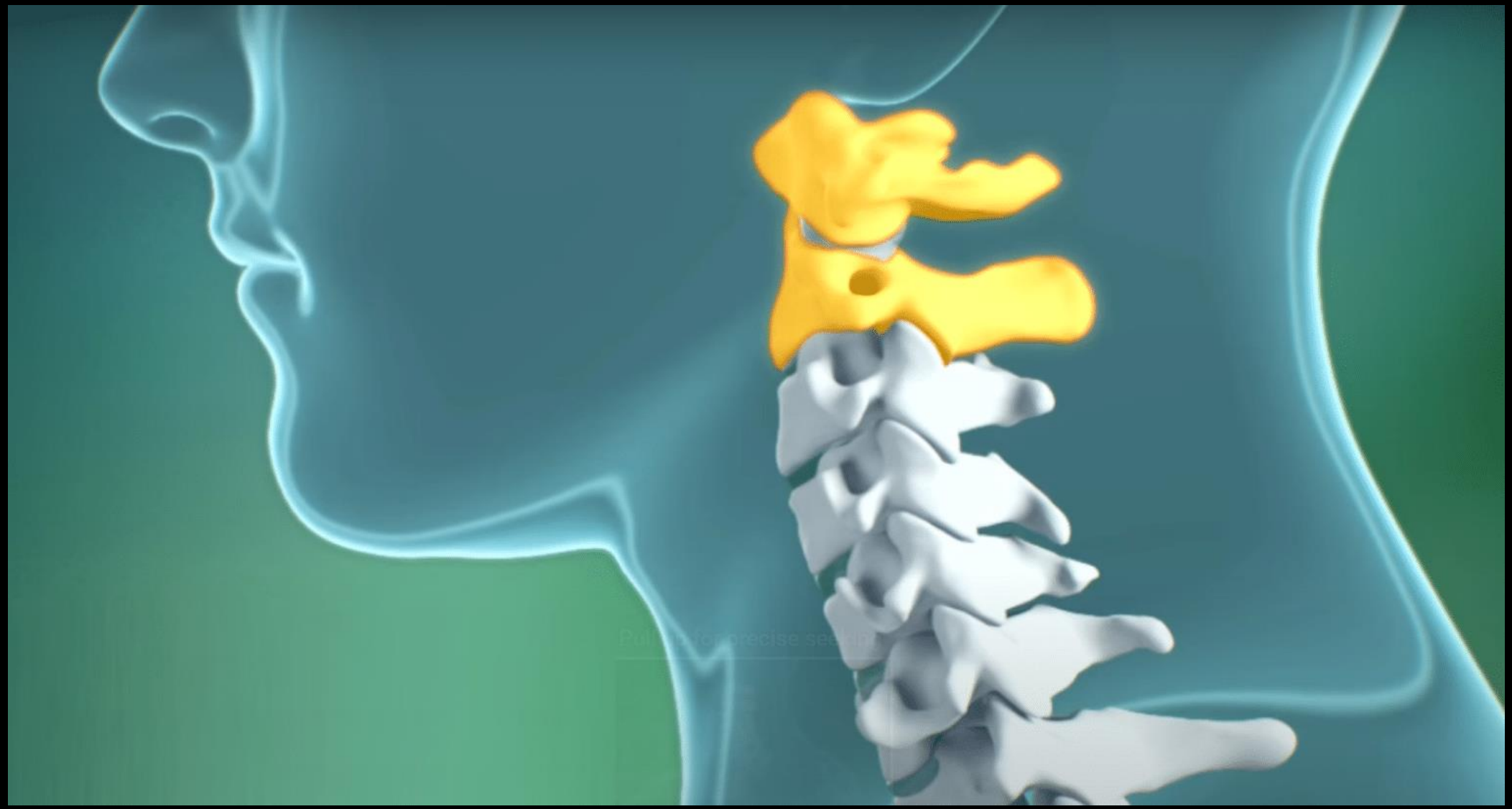
MRI



Daire A, Traumatic central cord syndrome. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-30935

70 yo F PMH rheumatoid arthritis develops hyporeflexia, weakness following intubation. Cause?

Atlantoaxial instability

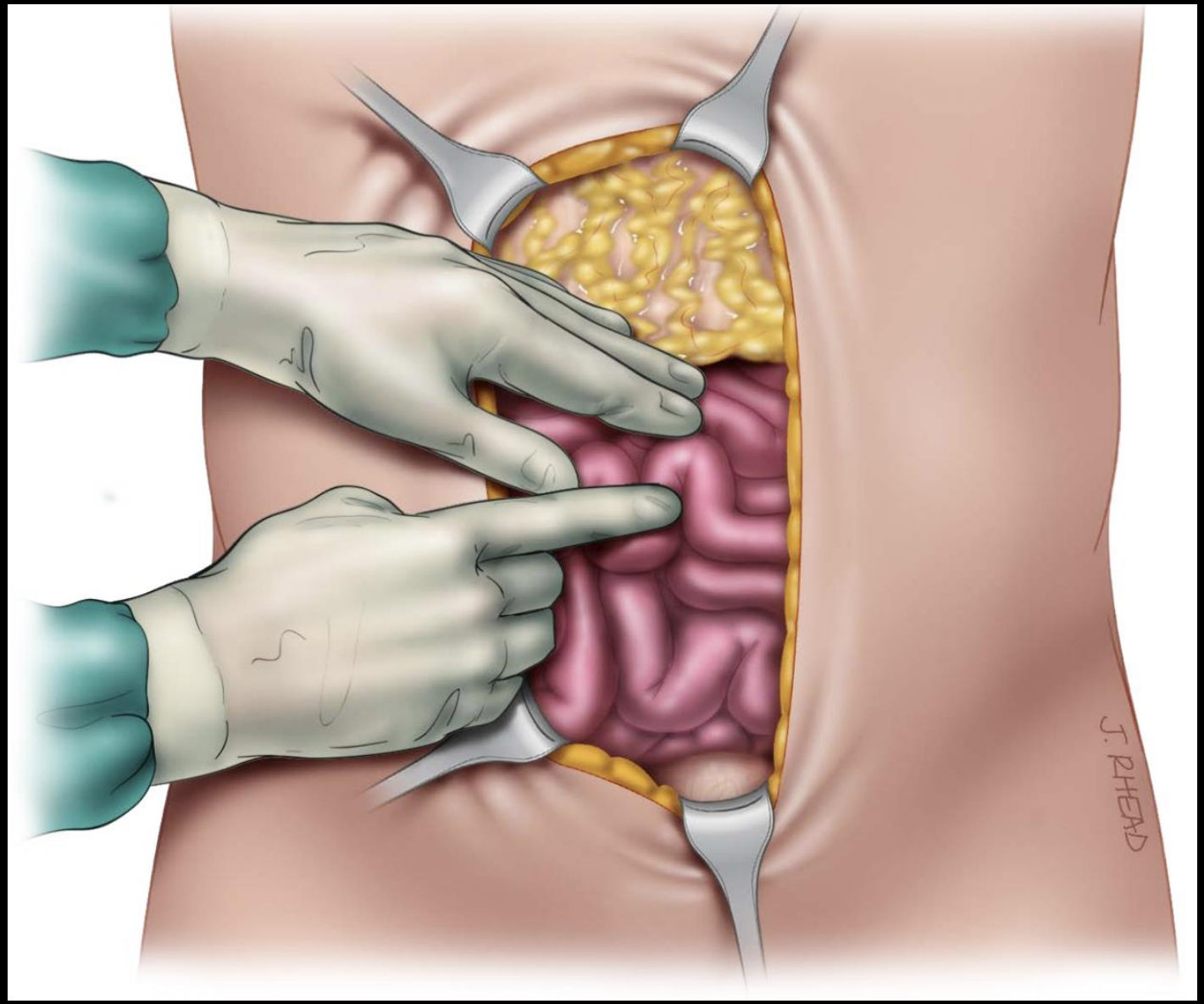


https://www.spineinfo.com/conditions/atlantoaxial-instability-definition/

Blunt Abdominal Trauma

40 y/o male involved with MVA presents with severe abdominal pain, GCS 13, T 98 F HR 120 RR 22 BP 90/60 Sat 99% RA. Rebound tenderness on exam. FAST positive for free intraperitoneal fluid. Next step?

Exploratory laparotomy



https://intermountainhealthcare.org/ckr-ext/Dcmnt?ncid=529310841

How much blood loss required for shock?

25-30%

Massive transfusion protocol?

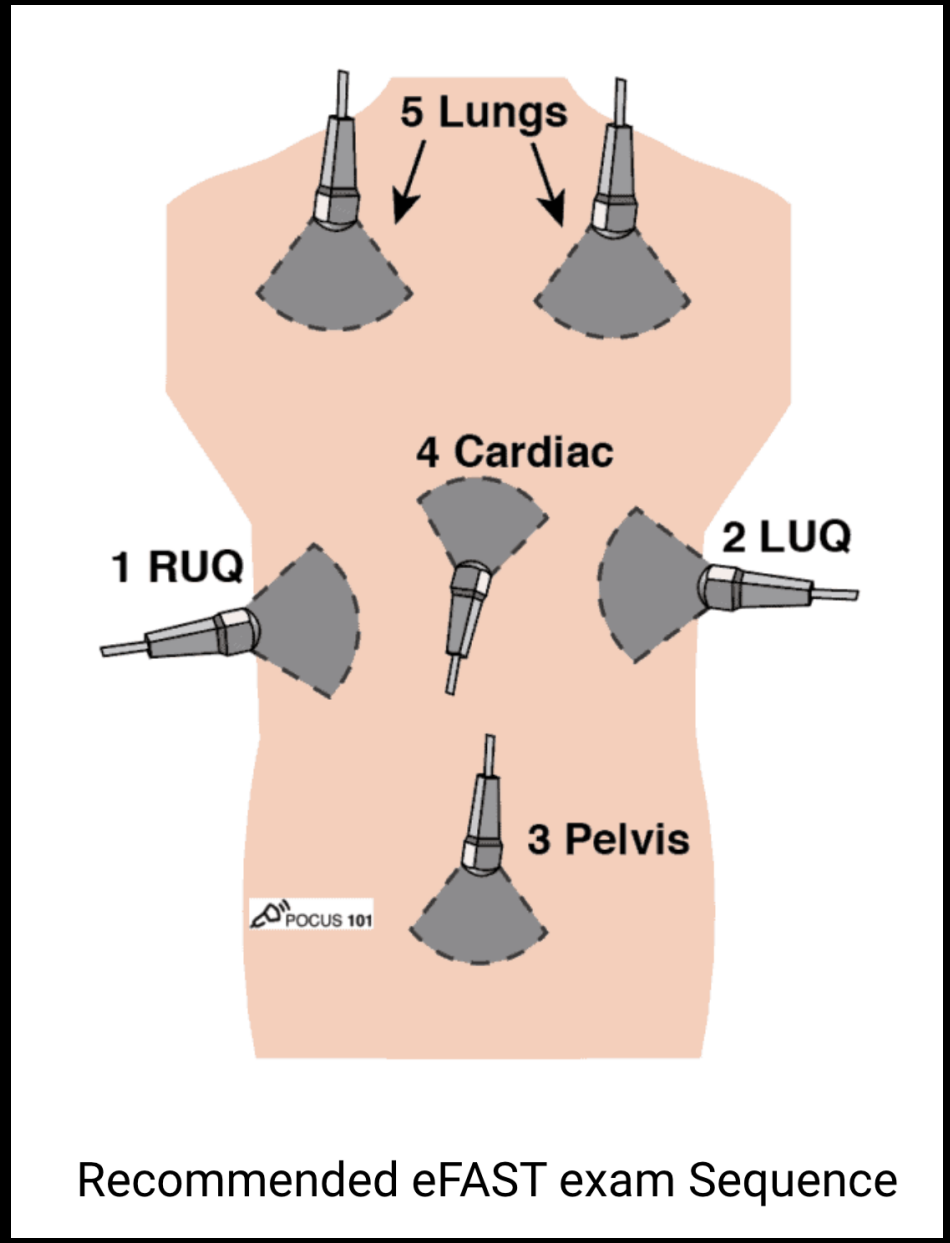
Anticipated massive blood loss (>4 U pRBC, >50% volume in 4 hr)

1:1:1 ratio RBC:plt:FFP

Imaging for hemodynamically unstable pt following blunt abdominal trauma?
FAST

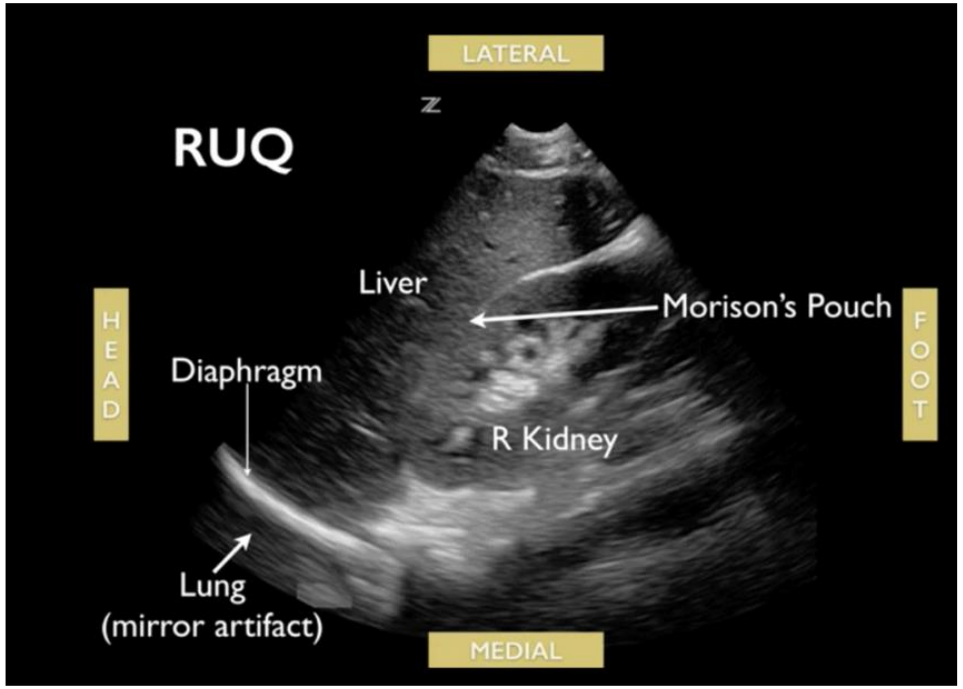
If inconclusive?
Diagnostic peritoneal lavage

If hemodynamically stable?
CT scan

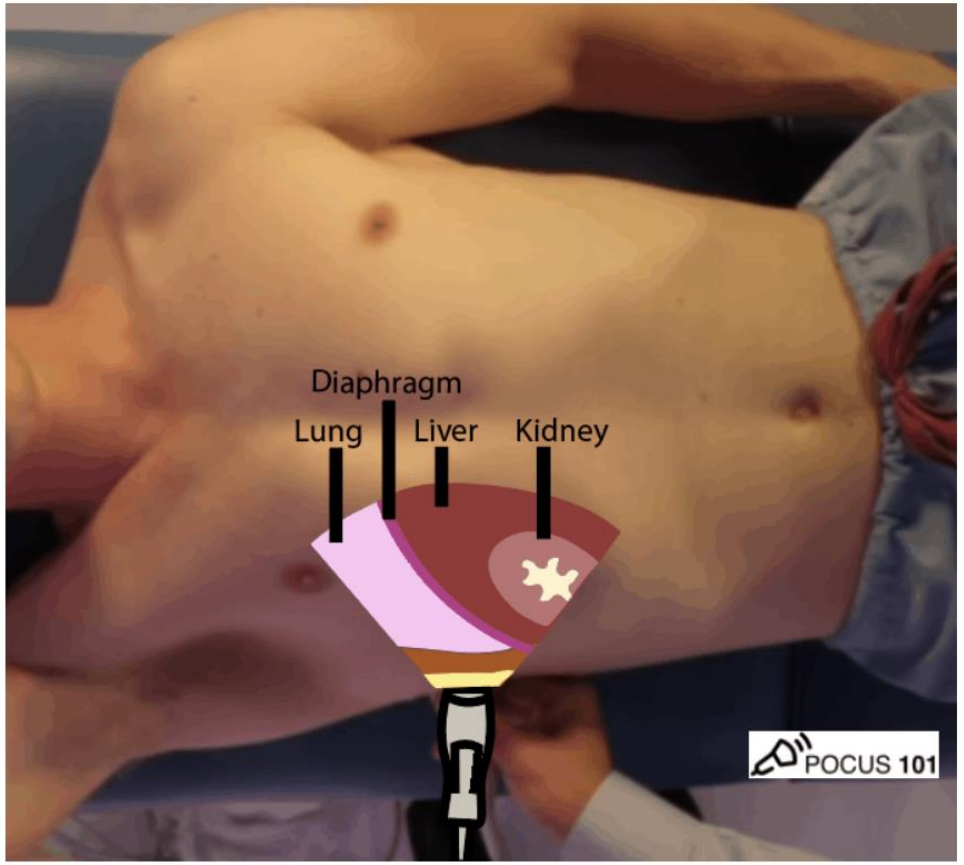


Recommended eFAST exam Sequence

https://www.pocus101.com/efast-ultrasound-exam-made-easy-step-by-step-guide/



Normal RUQ – eFAST exam



RUQ eFAST exam illustration

https://www.pocus101.com/efast-ultrasound-exam-made-easy-step-by-step-guide/

Blunt trauma at level of bicycle handlebars?

Pancreatic injury

Delayed injury following blunt abdominal trauma in children?

Duodenal hematoma

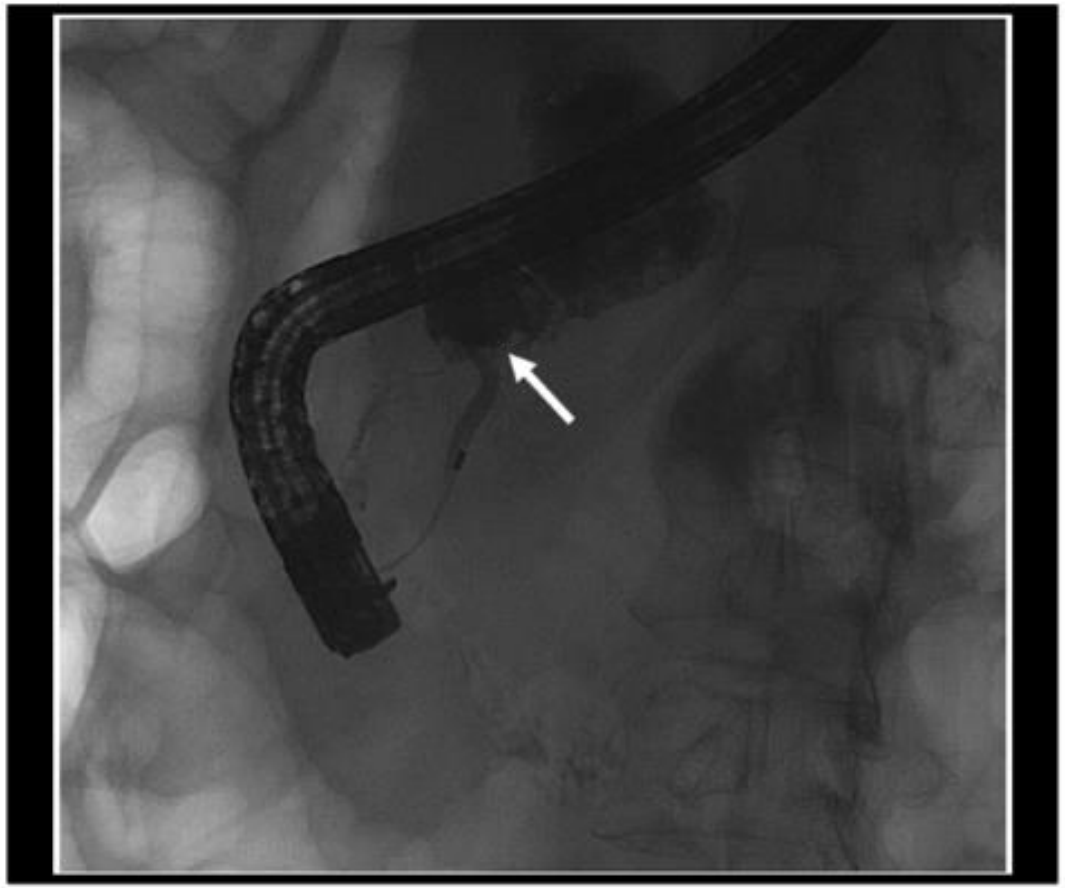


Figure 5. ERCP demonstrating the collection that communicates with the main pancreatic duct (arrow)

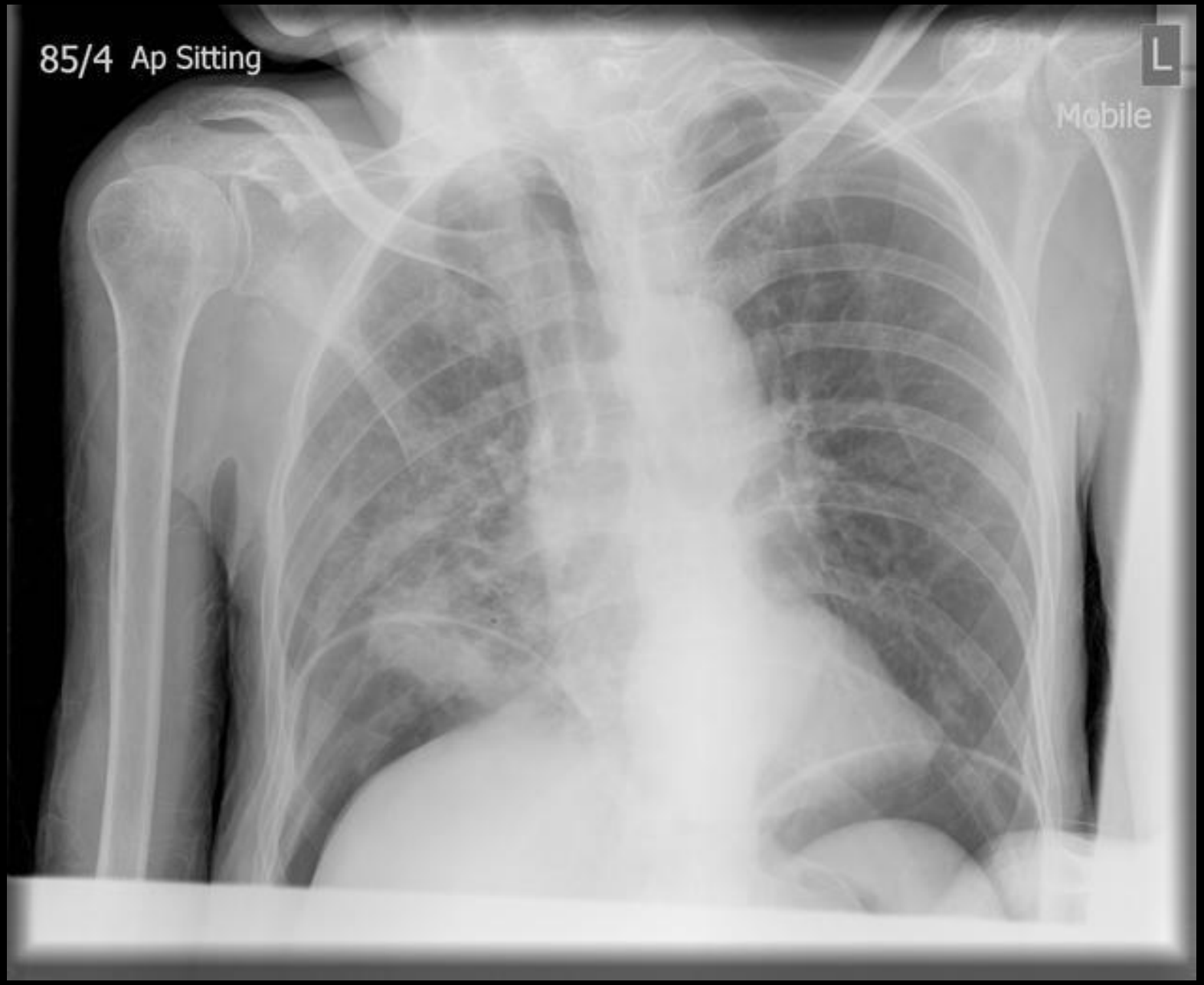
Figure 6. MRI demonstrating contrast extravasation (arrow)

https://practicalgastro.com/2024/06/06/pancreatic-duct-leaks/

Gaillard F, Duodenal hematoma. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-7140

If viscus is seen on CXR?

Perforated diaphragm



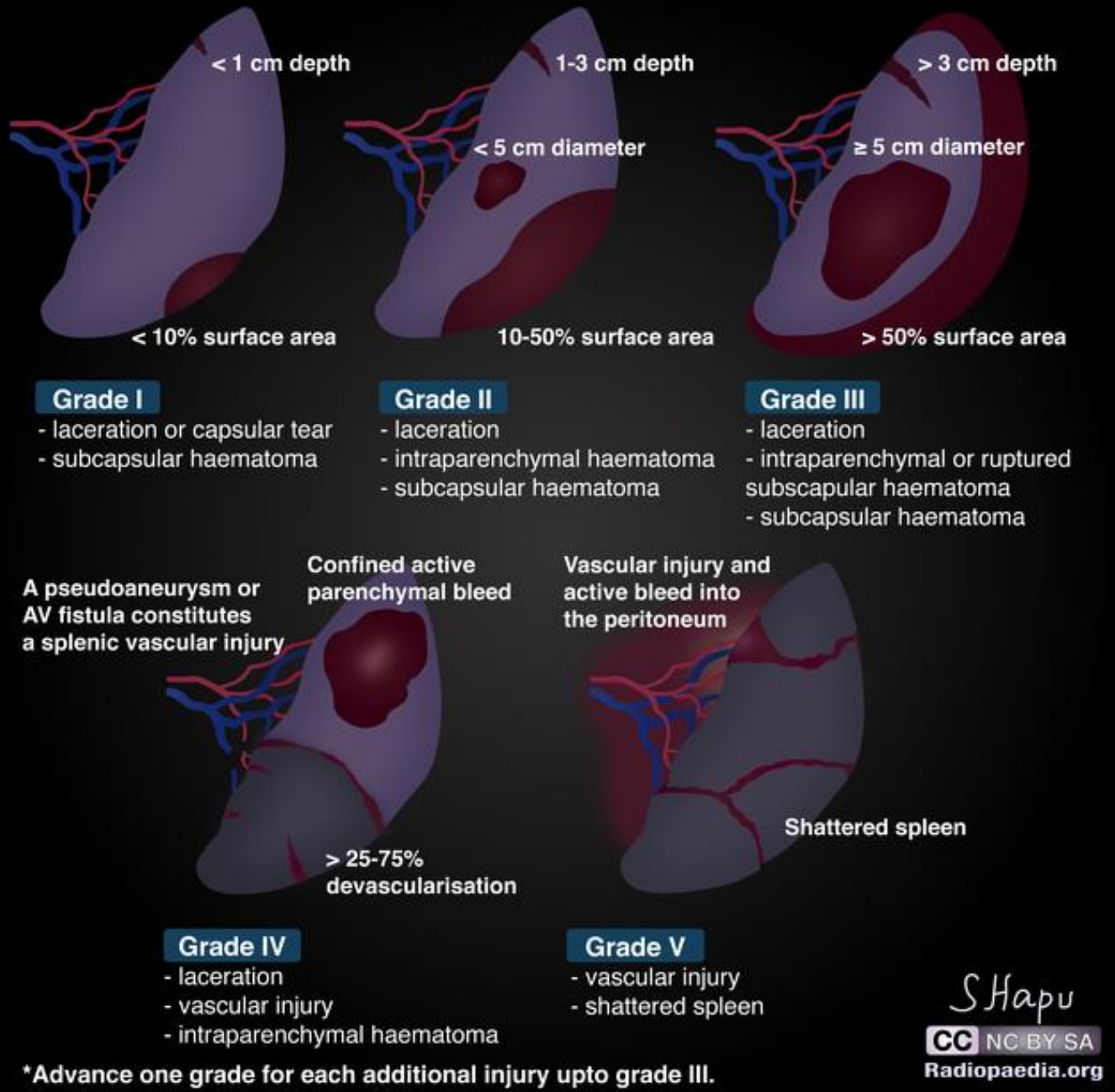
Jones J, Pneumoperitoneum. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-6129

65 year old patient fell off a ladder onto their left side on now has severe pain. Vitals HR 110 BP 80/55 RR 27 T 97. FAST exam with intraperitoneal fluid. Next step?

Ex-lap, likely splenectomy

Spleen injury grading?

I-V



Hapugoda S, Spleen trauma grading (diagrams). Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-51434

Imaging for likely spleen injury if stable?

CT, consider embolization

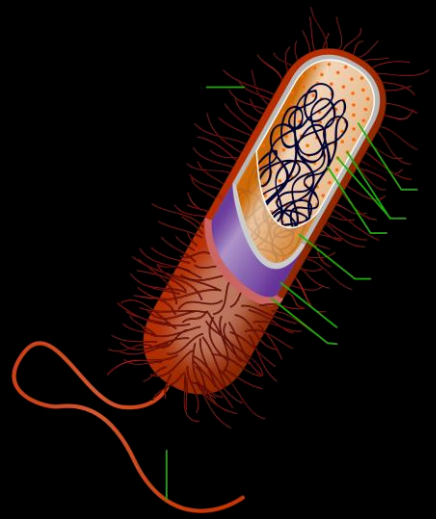
Vaccination timing?

Technically 2 weeks is optimal, but usually give during hospitalizations for logistics

Which vaccines?

SHiN

Di Muzio B, Splenic trauma - AAST grade V. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-46493



Mby Ali Zifan - Own work using: Biology 10e Textbook (chapter 4, p. 63) by: Peter Raven, Kenneth Mason, Jonathan Losos, Susan Singer · McGraw-Hill Education., CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=44194140

40-year-old M with gunshot wound to abdomen at T8. Exit wound is not visualized. Next step?

40-year-old M with gunshot wound to abdomen at T8. Exit wound is not visualized. Next step?

Ex lap!

Any entry or exit wound below T4-involves abdomen

Gunshot wound involving abdomen basically always requires ex lap

45-year-old with stab wound, hemodynamically stable, no rebound tenderness. Next step?

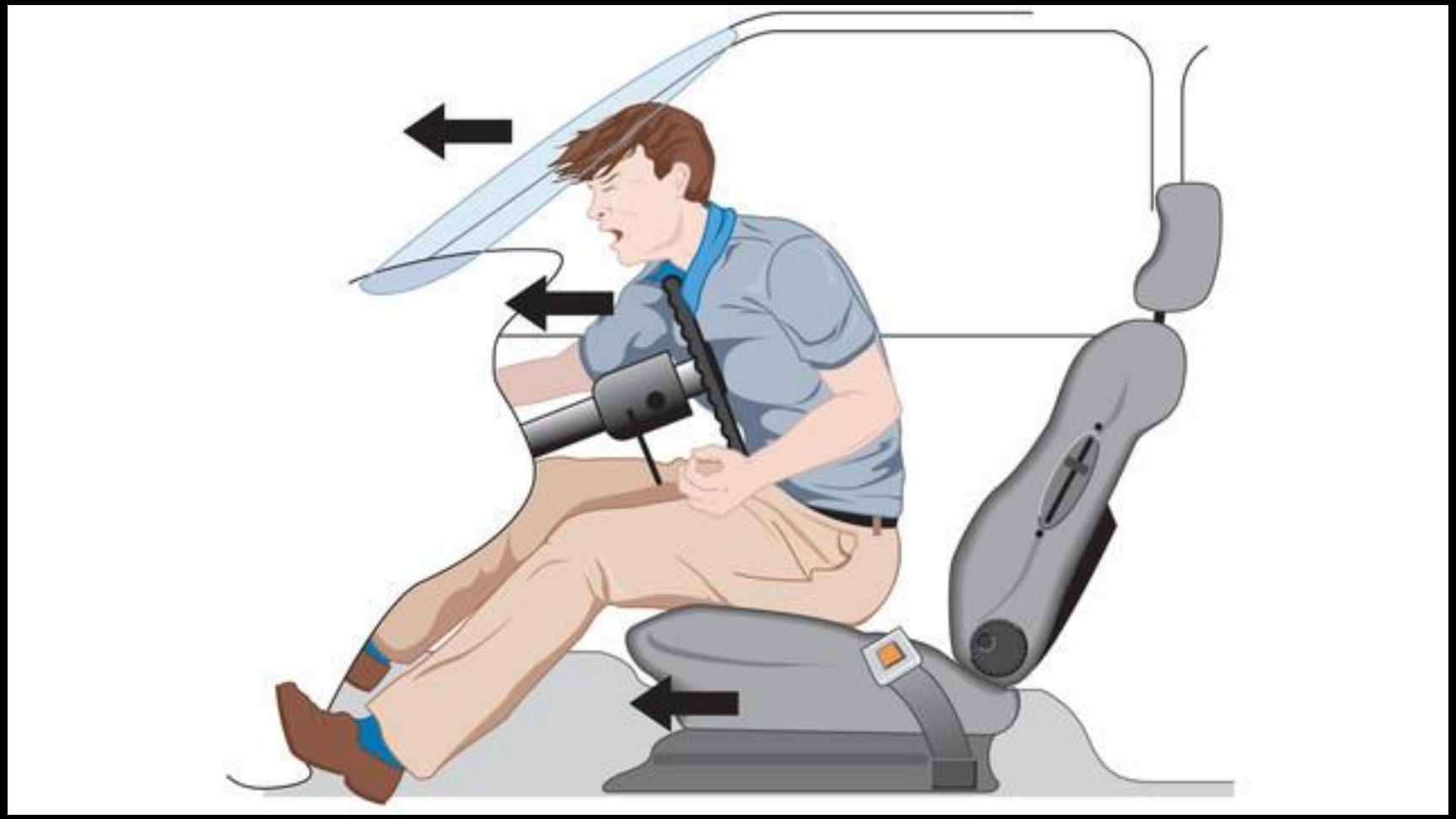
Local wound exploration (gloved finger)

Evaluate for peritoneal involvement, organ injury

If unstable or peritoneal signs?

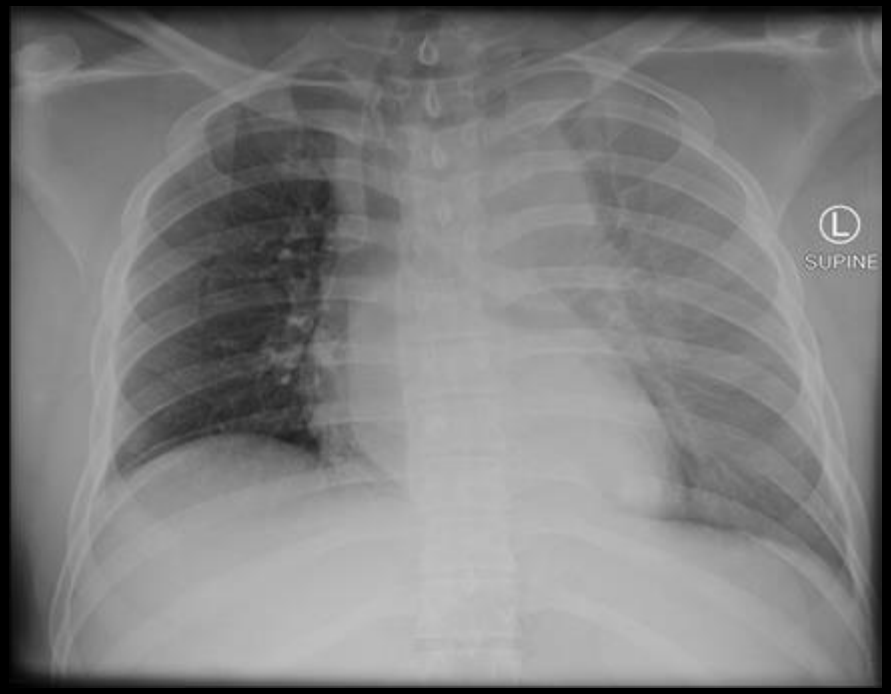
Ex lap

Chest Trauma



https://medictests.com/units/quick-and-dirty-guide-to-chest-trauma

35-year-old M MVA has hypotension, tachycardia, severe chest pain, widened mediastinum on CXR.



Case courtesy of Andrew Dixon, Radiopaedia.org, rID: 45368

Traumatic rupture of the aorta

Treatment:

Open surgical repair (Open thoracotomy)

28-year-old football player is hit in the chest and suffers cardiac arrest?

Commotio cortis

Most common arrythmia?

Vfib

Area of the heart most commonly injured?

Right ventricle

Why?

Most anterior

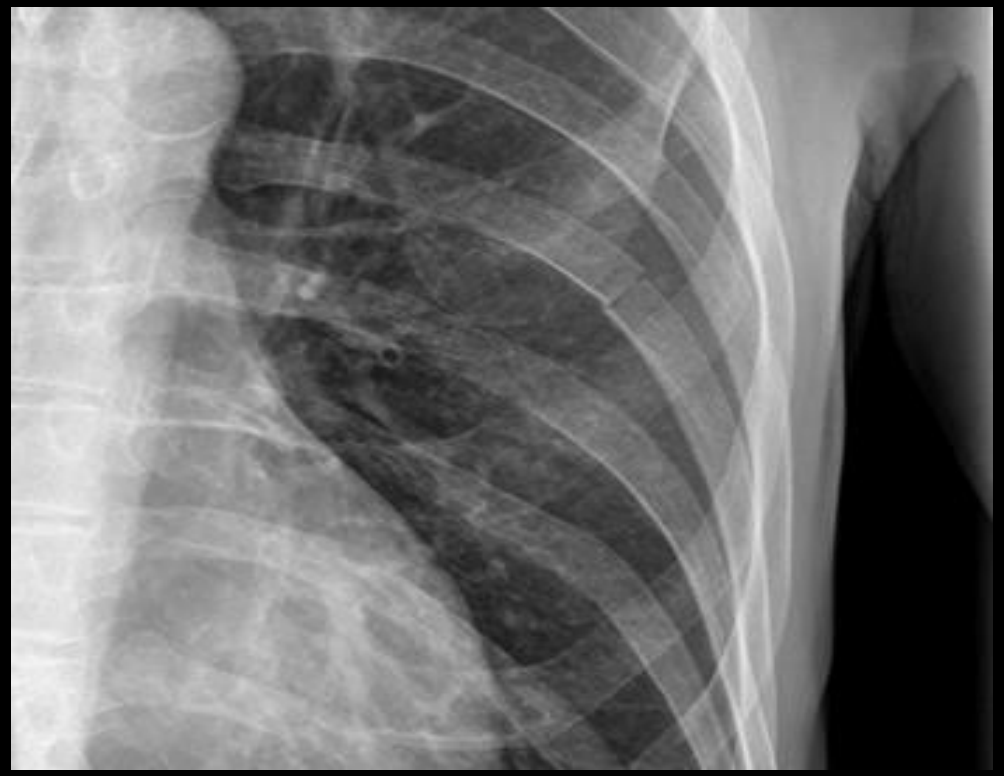
Tachycardia, elevated JVP, hypotension unresponsive to fluid resuscitation, arrythmia 3 days following chest trauma?

Cardiac contusion

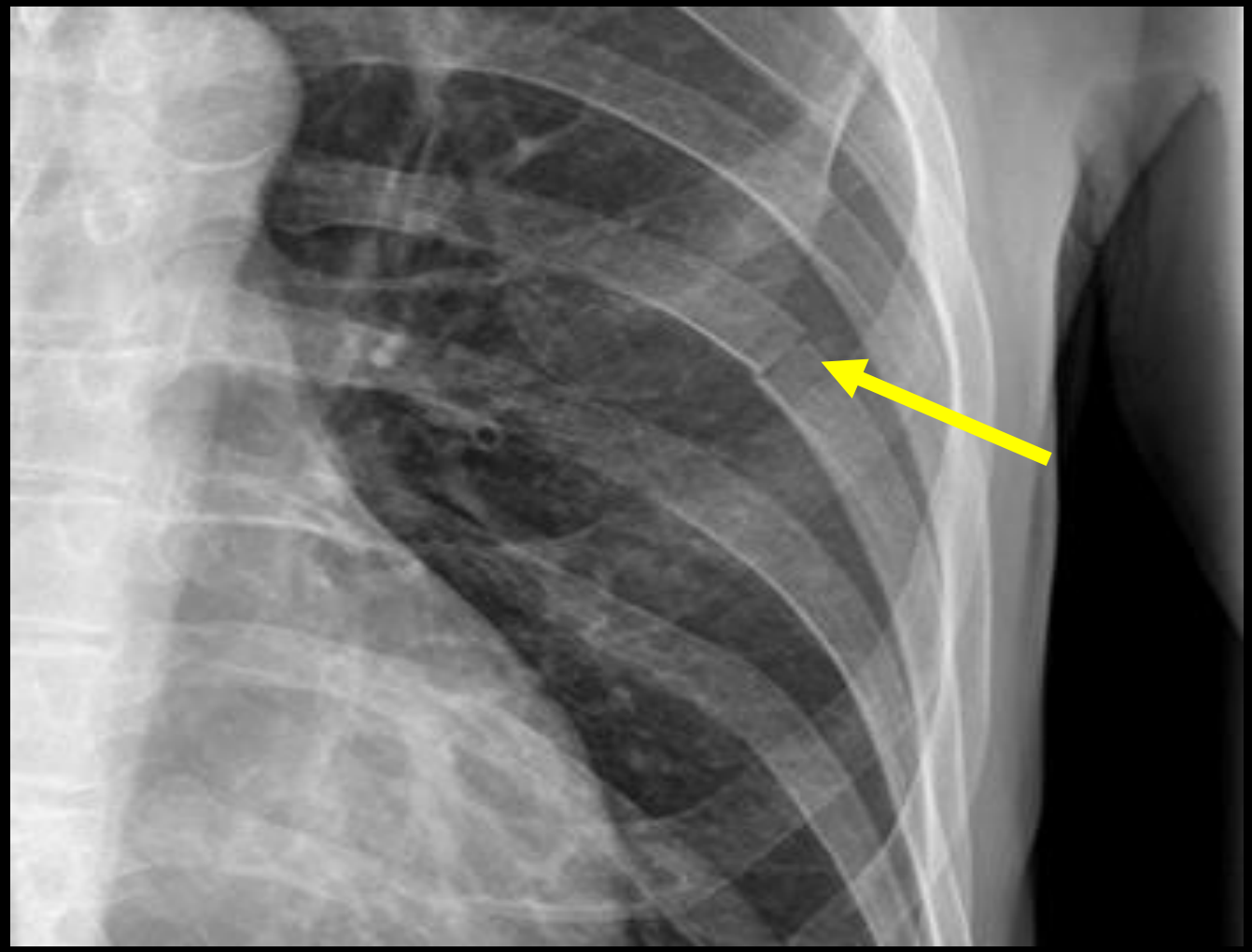
Tests?

ECG, Echo, Troponin

60-year-old M fell down the stairs, now has left-sided chest pain. Tenderness to palpation of left chest wall. CXR below. Dx?



Case courtesy of Mohammad Osama Hussein Yonso, Radiopaedia.org, rID: 92856



Case courtesy of Mohammad Osama Hussein Yonso,
Radiopaedia.org, rID: 92856

60-year-old M fell down the stairs, now has left-sided chest pain. Tenderness to palpation of left chest wall. Likely Dx?

Rib fracture (T7)

Treatment?

Adequate pain control, IS

What if patient has continued hypoxia, multiple rib fractures?

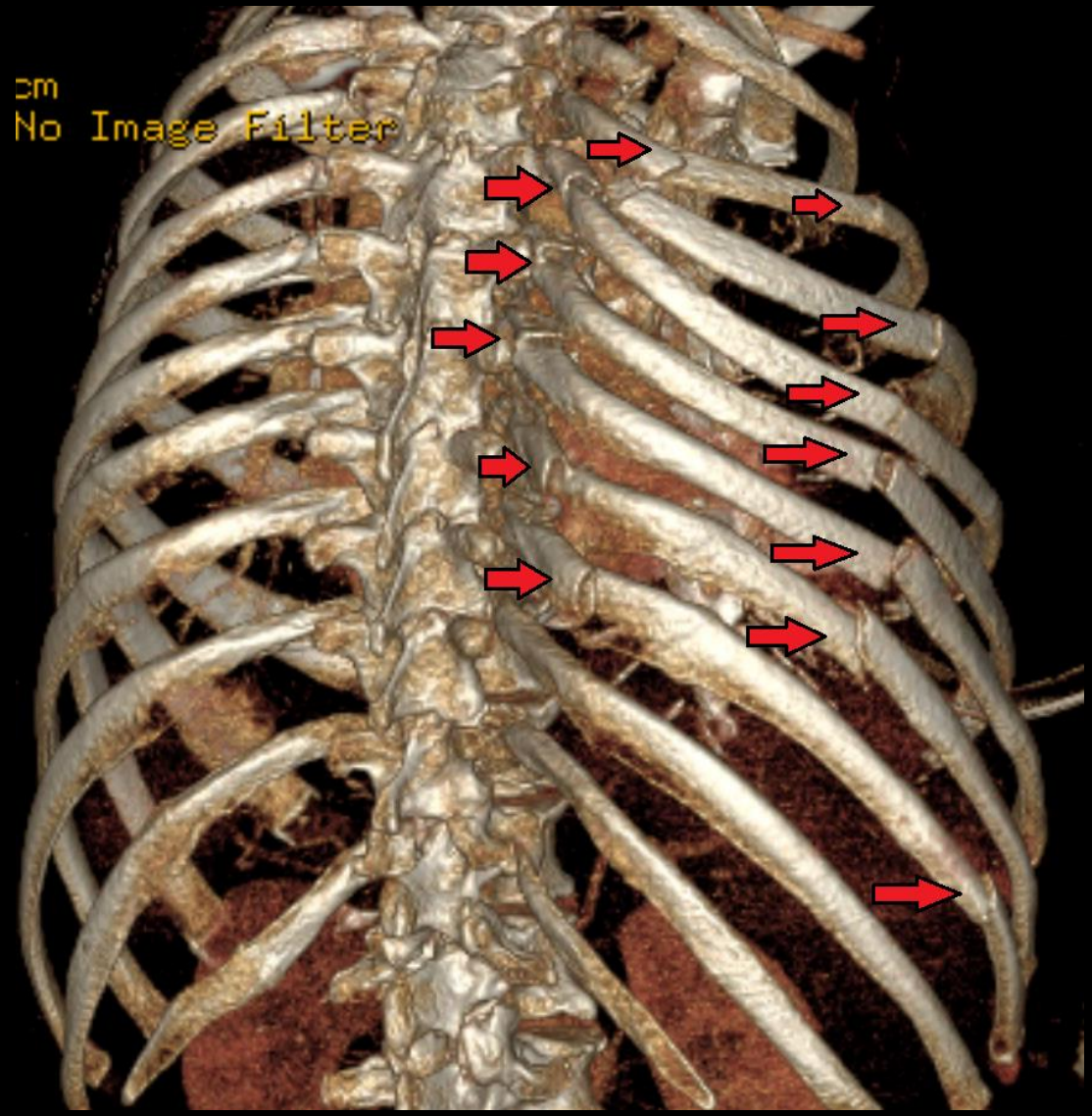
Flail chest

Mechanism?

Paradoxical inward motion during inspiration

How many contiguous fractures required?

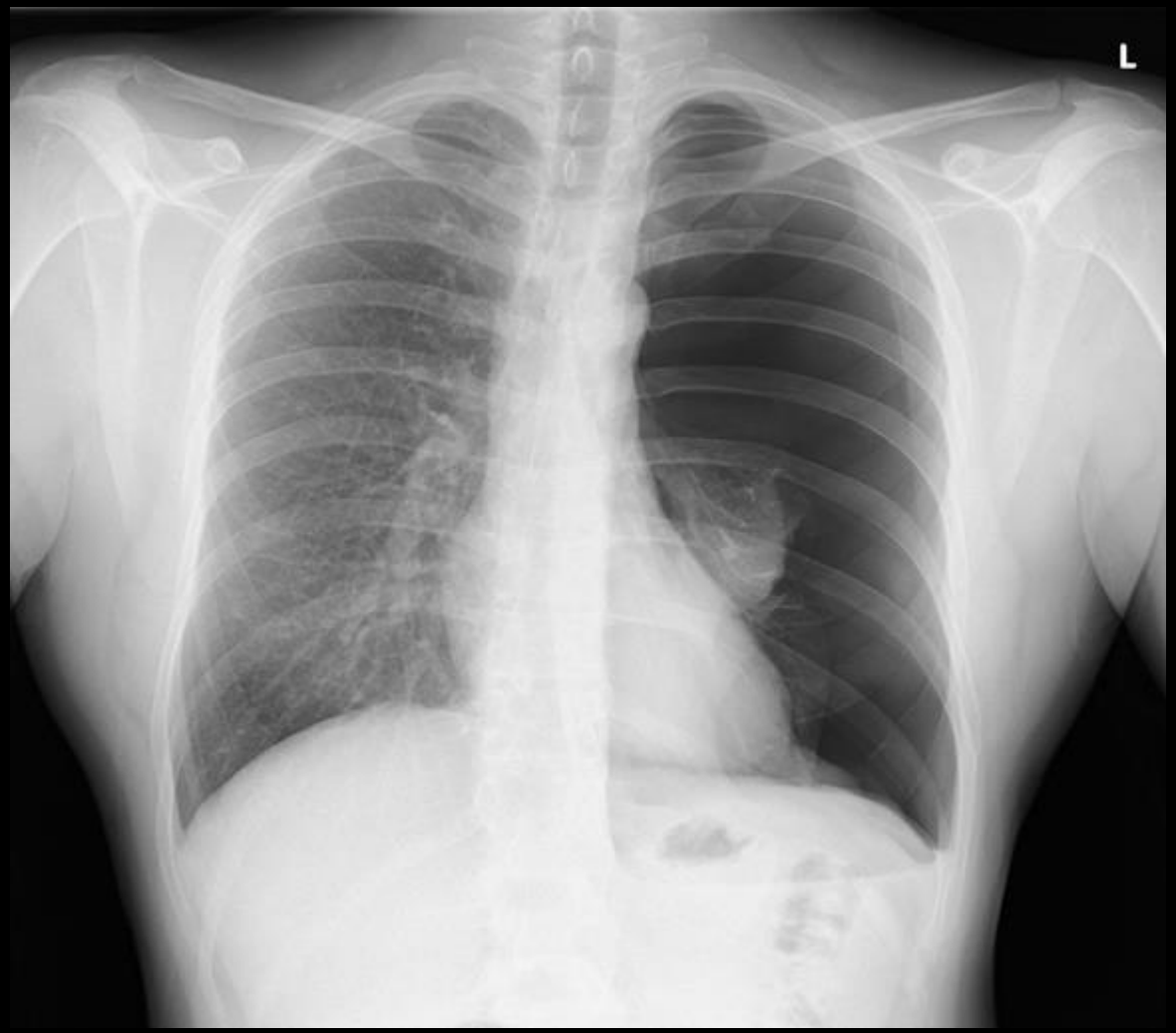
3



James Heilman, MD, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons

60-year-old M fell down the stairs, now has left-sided chest pain, dyspnea.
Exam: absent breath sounds on L side, elevated JVP. Next step?

Needle thoracocentesis (Tension Pneumothorax)
Consider chest tube in stable patients without tension physiology



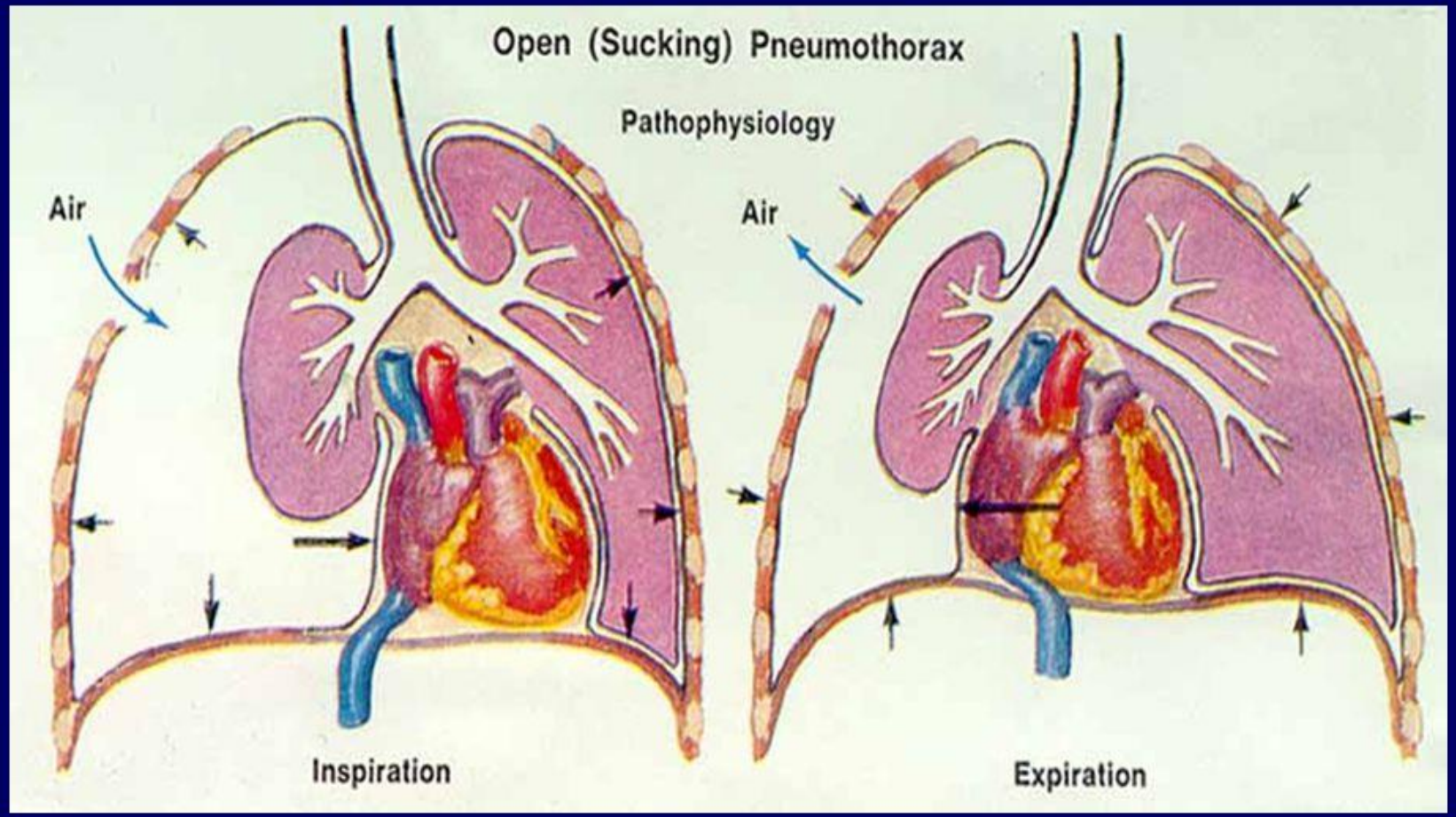
Case courtesy of Ian Bickle, Radiopaedia.org, rID: 86926

Open chest wall injury with pneumothorax noninvasive management?

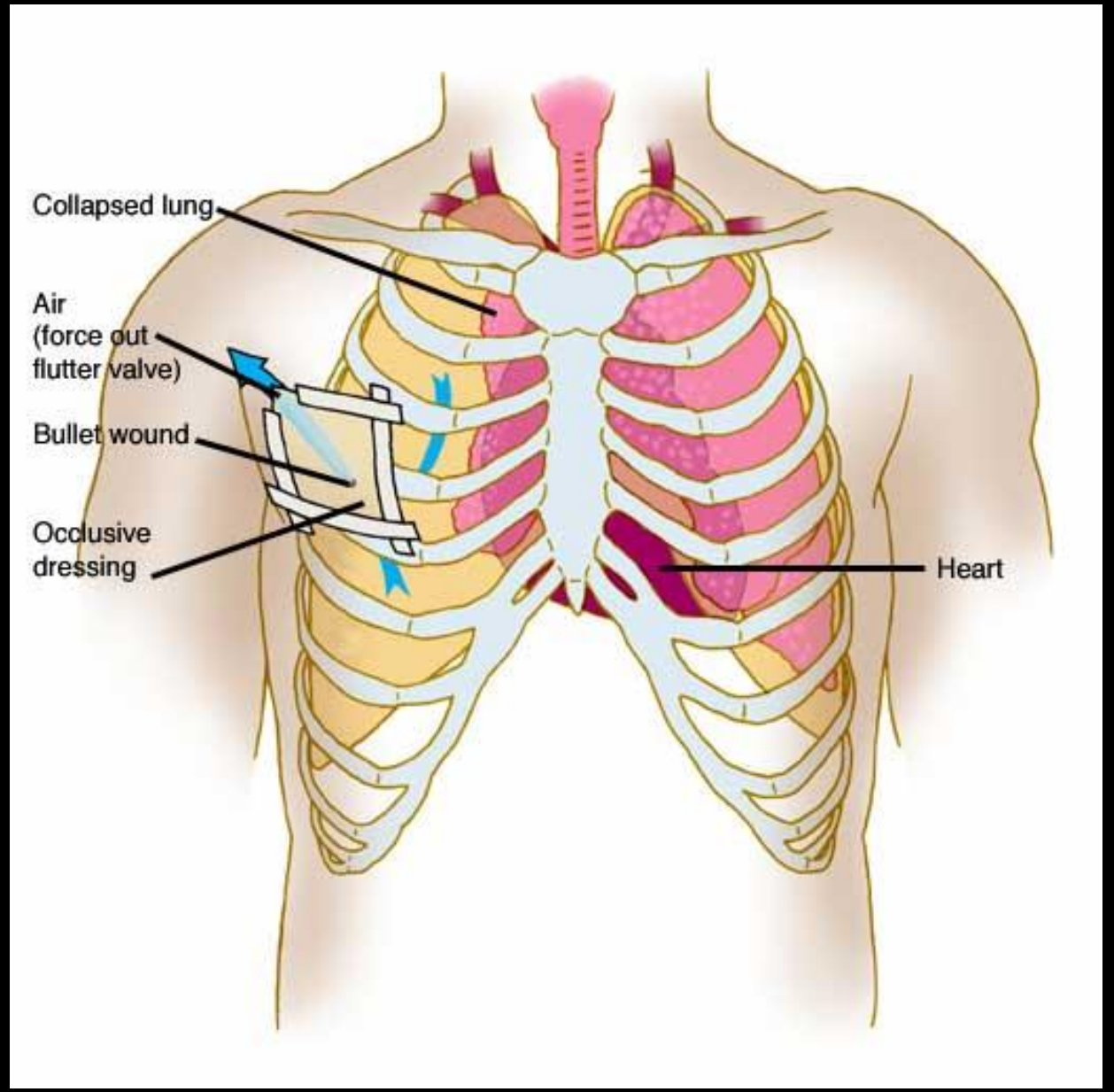
"Sucking injury"

Partially occlusive dressing (tape 3 sides)

SUCKING CHEST WOUND



https://blog.georgiaemsacademy.com/?p=1314



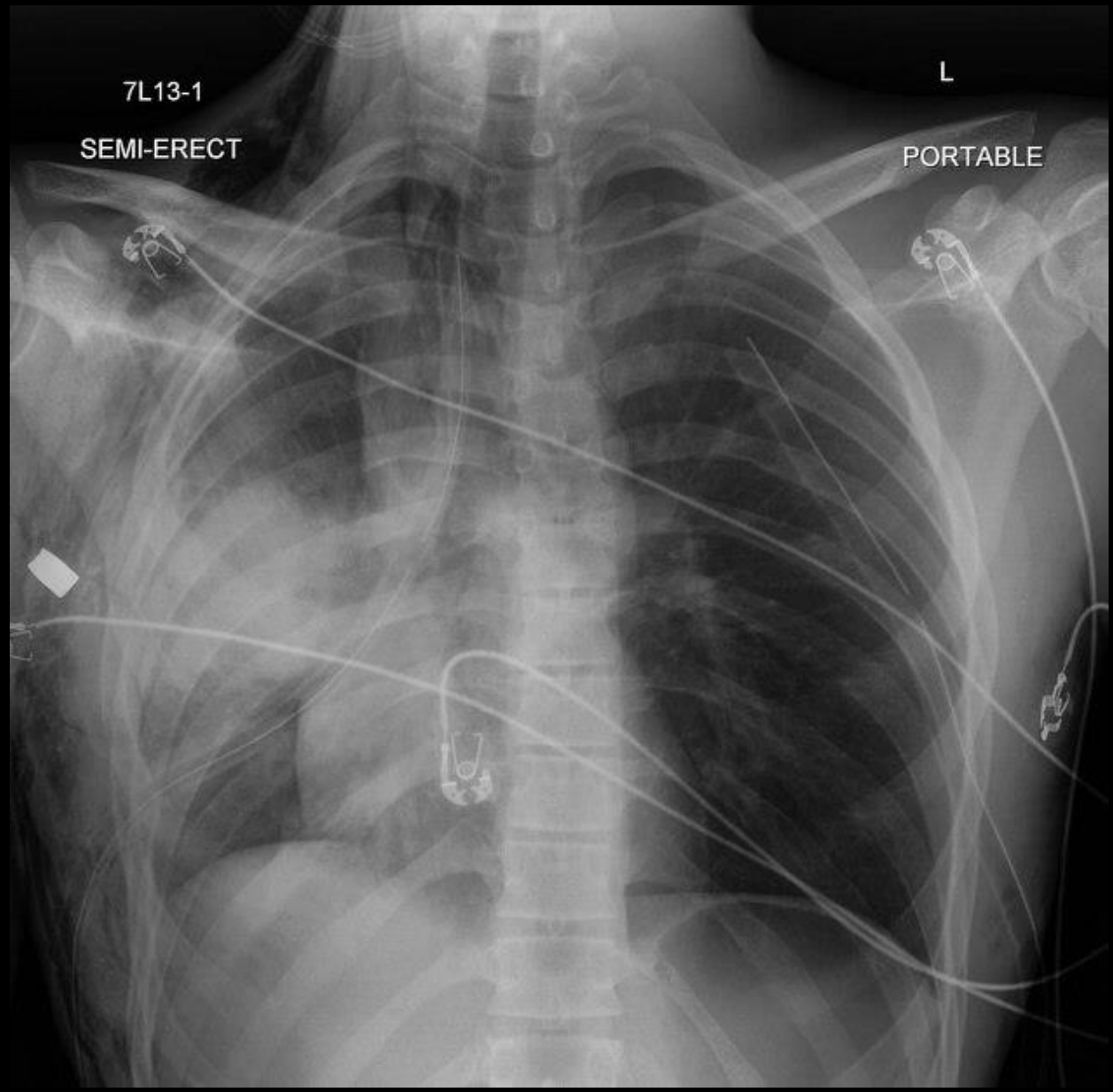
https://blog.georgiaemsacademy.com/?p=1314

Dyspnea, tachypnea, “hazy infiltrates” 3 days following chest trauma?

Pulmonary contusion

Management?

Supportive



Hislop J, Pulmonary contusion after gunshot wound. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-148718

Persistent pneumothorax, subcutaneous emphysema, crepitus, persistent air leak even after chest tube placement?

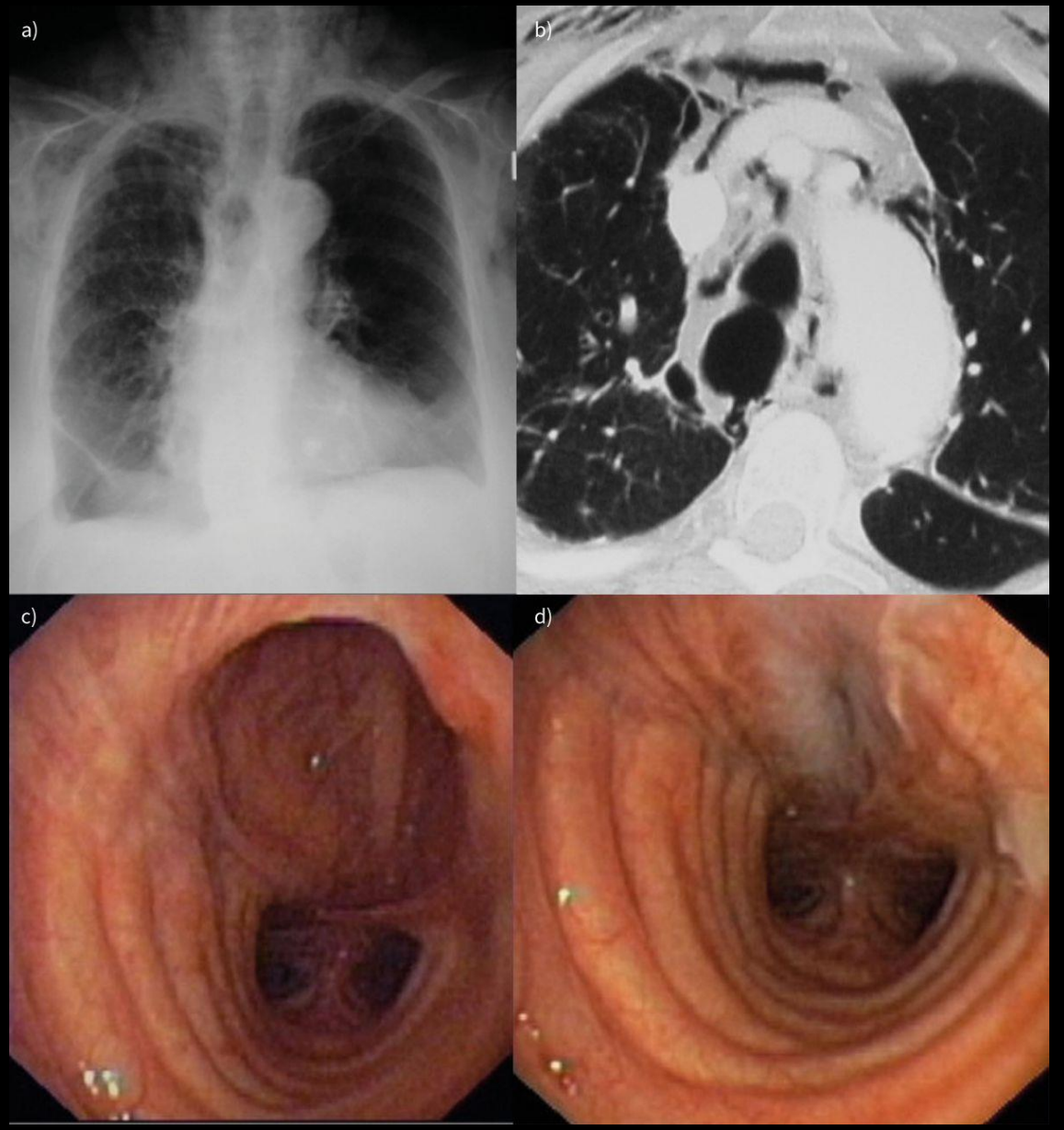
Tracheobronchial injury

Management?

Fiberoptic bronchoscope

Another trauma indication for bronchoscopy?

large hemoptysis (>600 mL)

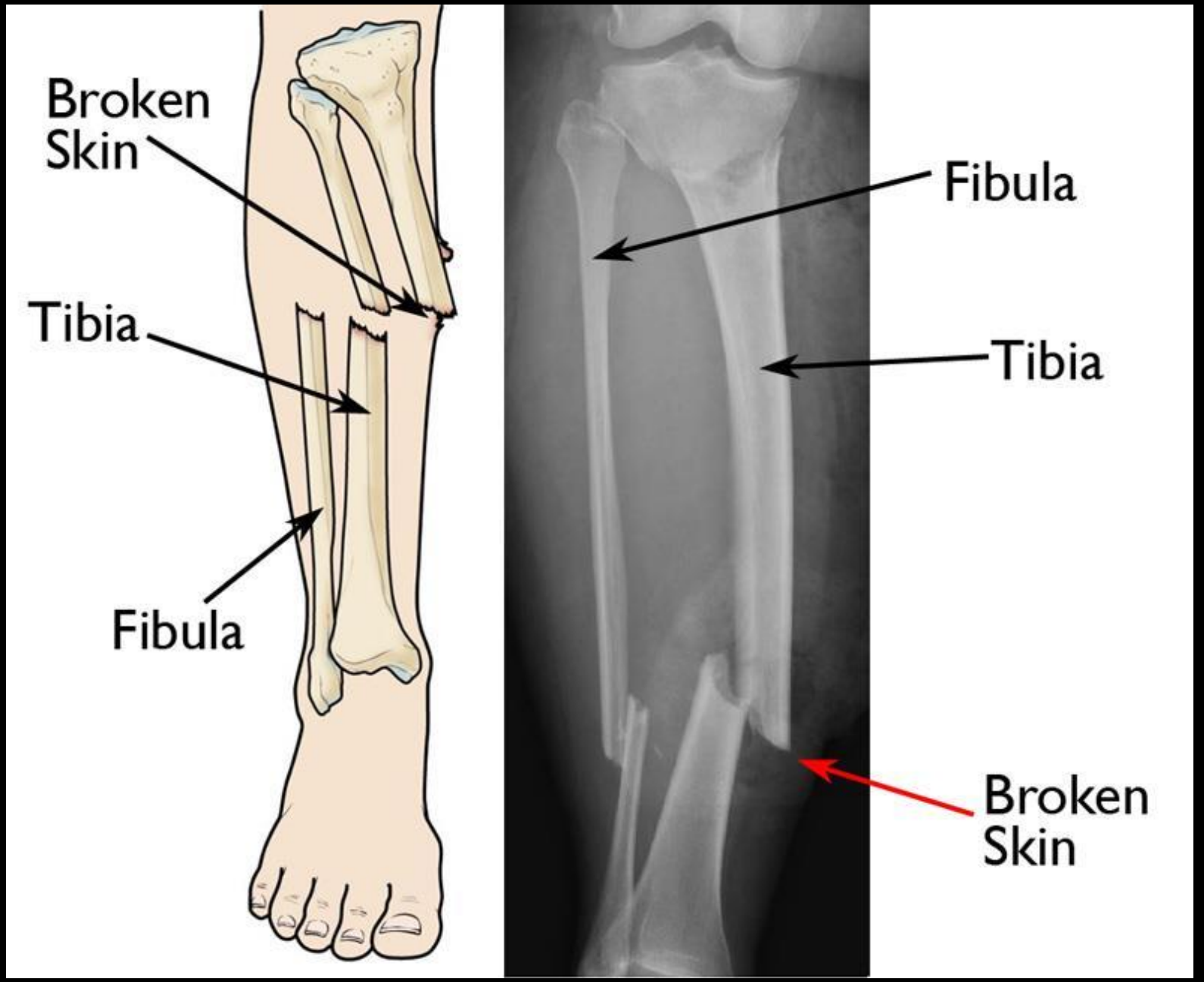


Jacques Boutros, Charles-Hugo Marquette, Carole Ichai, Sylvie Leroy, Jonathan Benzaquen
European Respiratory Review 2022 31: 210126; DOI: 10.1183/16000617.0126-2021

Ortho

45 year old gentleman presenting with severe R leg pain after MVA. VSS. Imaging shown. Next step?

(Right) Reproduced from Egol KA, Gardner MJ, eds: Let's Discuss Management of Common Fractures. Rosemont, IL, American Academy of Orthopaedic Surgeons, 2016, pp. 135-152.
https://orthoinfo.aaos.org/en/diseases--conditions/open-fractures/



(Right) Reproduced from Egol KA, Gardner MJ, eds: Let's Discuss Management of Common Fractures. Rosemont, IL, American Academy of Orthopaedic Surgeons, 2016, pp. 135-152. https://orthoinfo.aaos.org/en/diseases--conditions/open-fractures/

OPEN FRACTURE!

Saline irrigation, early initiation of anibiotics

ORIF vs External fixation

Example of open fracture (bone exposed to skin/environment)

From SpongeBoB SquarePantsL Season 6, Episode 3 Sunction Cup Symphony

Open Reduction and Internal Fixation (ORIF)

Gaillard F, Ankle fracture - Weber C (post-operative). Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-8895

External Fixation (Ex fix)

Muniraj S, Open tibia and fibula fracture. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-49420

https://www.verywellhealth.com/external-fixation-2548519

16 year old presented to ED after falling on outstretched arm during basketball game. VSS. Radiographic findings below. Next best step?

Hacking C, Ismail M, Balasubramanian S, et al. Reference article, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-41643

Closed manual reduction

Basic 3-step method:

1. Fracture distraction (pull)

2. Increase the deformity (bend)

3. Decrease the deformity (straighten)

Hacking C, Ismail M, Balasubramanian S, et al. Closed manual reduction. Reference article, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-41643

89 year old presenting with pain after fall. Exam: Shortening of left lower extremity and external rotation. Radiograph below. Next step in management?

Lustosa L, Intertrochanteric fracture of the femur. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-99630

Hip fracture Treatment:

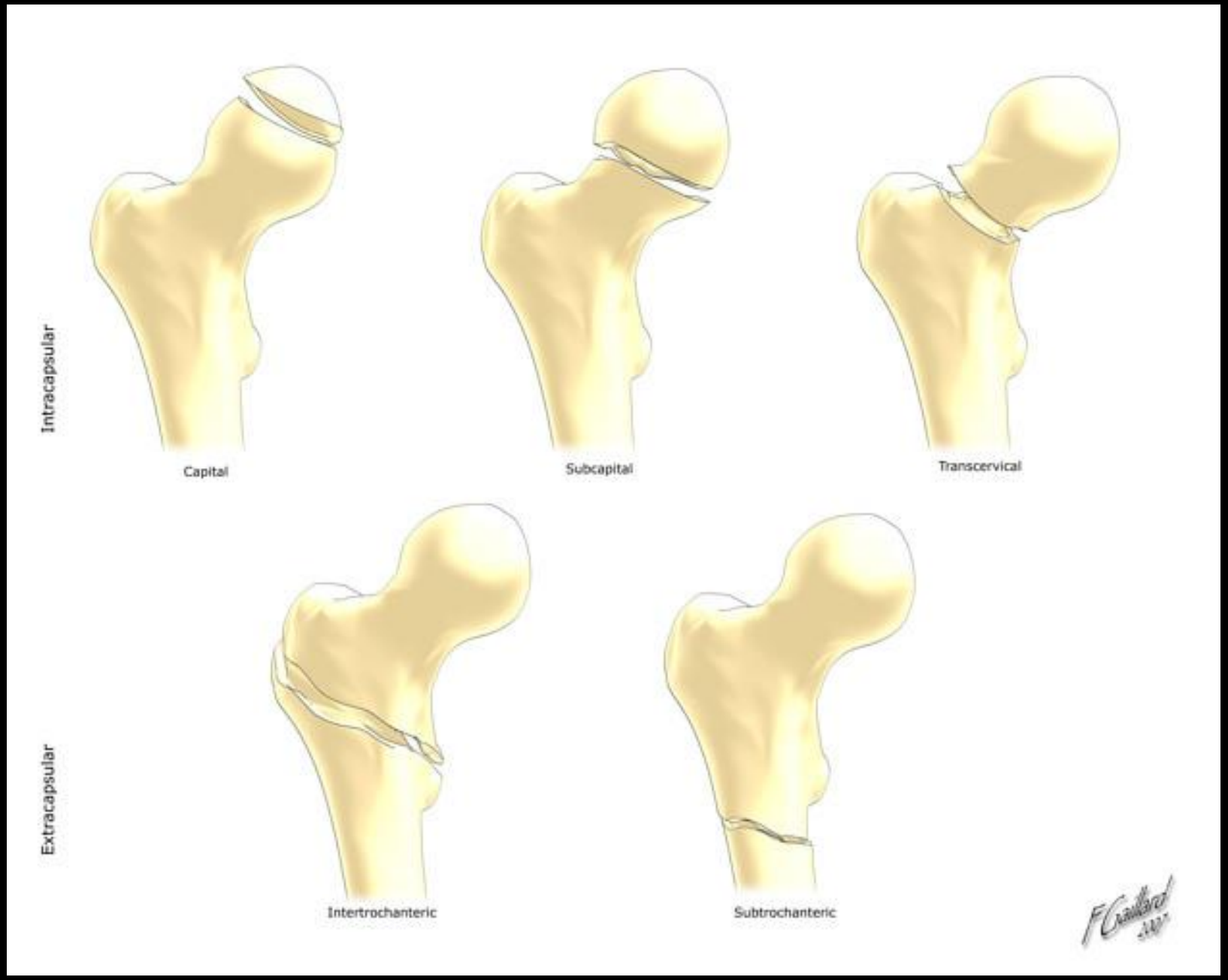
Step 1. **Stabilize**

Step 2. **Surgical repair**

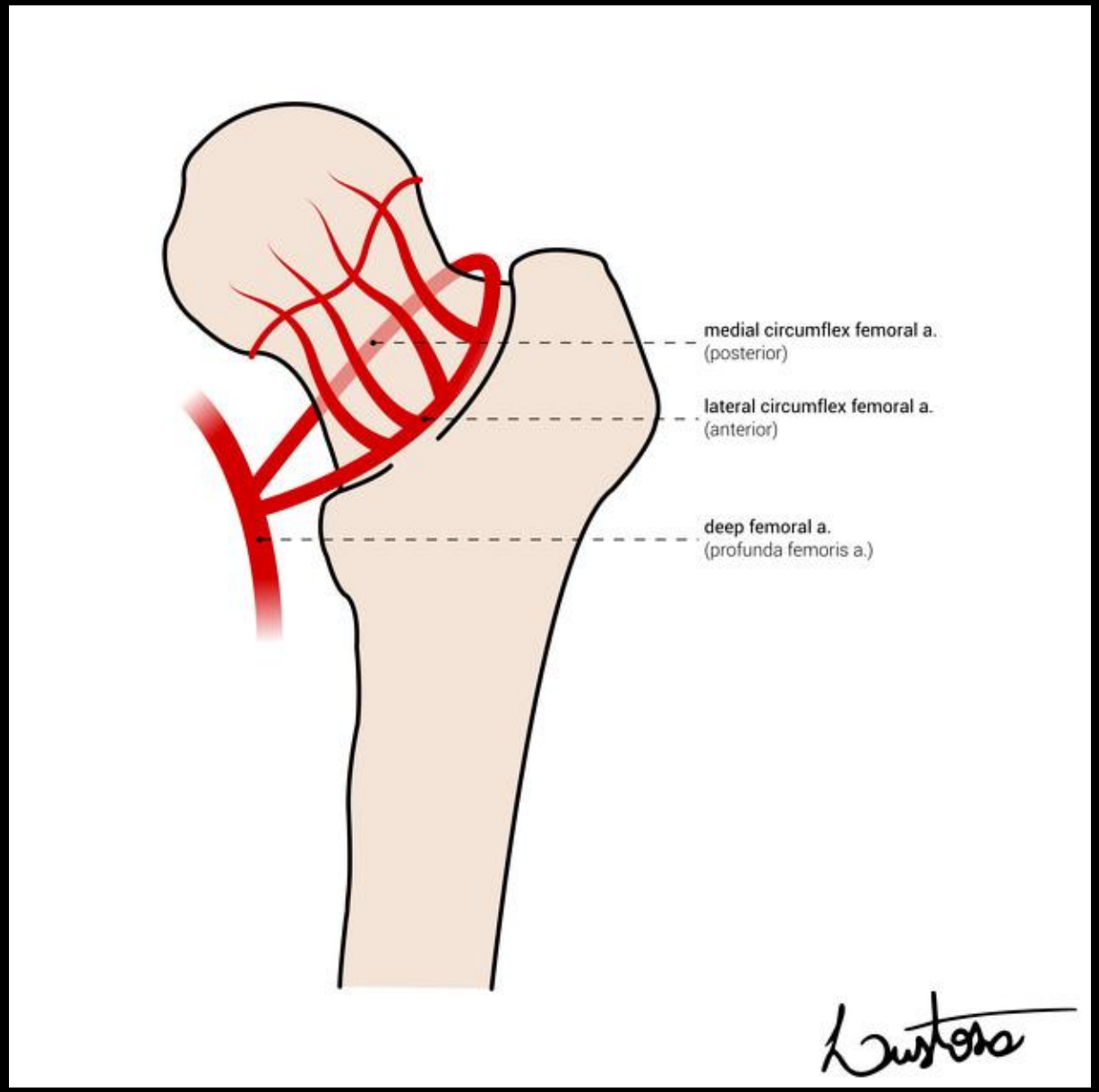
Er A, Proximal femoral nailing for intertrochanteric fracture. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-89095

Gaillard F, Impacted subcapital fracture. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-2717

Hacking C, Hip hemiarthroplasty. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-37705

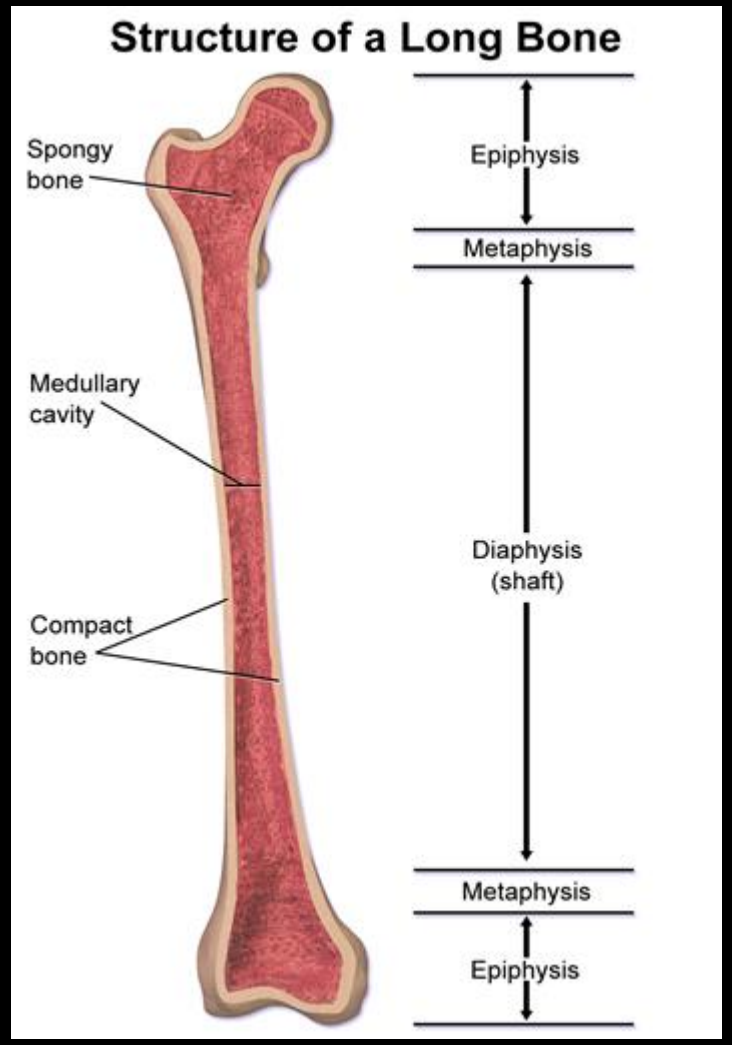


Gaillard F, Proximal femoral fractures (illustration). Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-35815

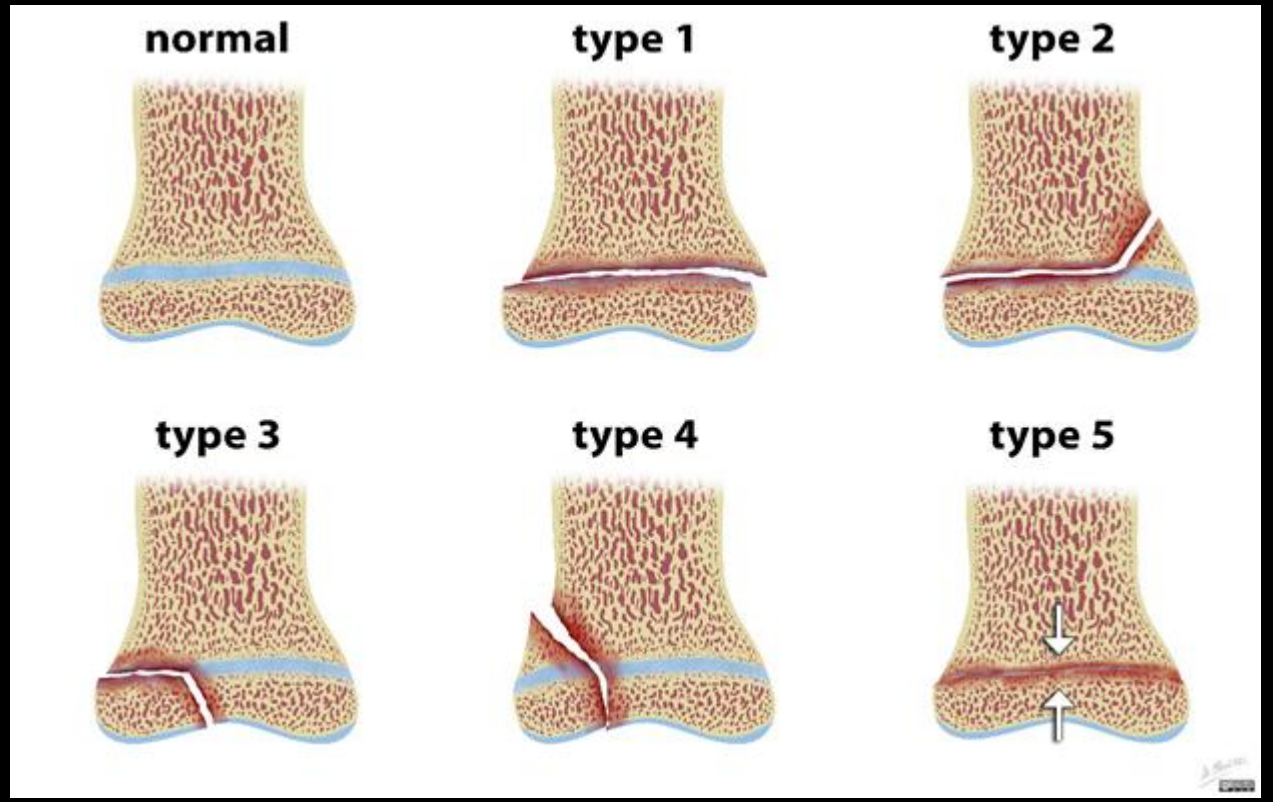


Lustosa L, Femoral head blood supply. Case study, Radiopaedia.org (Accessed on 19 Oct 2024) https://doi.org/10.53347/rID-98942

More Basic Ortho



Wikipedia/Public Domain



Case courtesy of Matt Skalski, Radiopaedia.org, rID: 27144

40 y/o unknown PMH after 2 days postop following tibia fx repair (ORIF) develops seizure, hypertension, tachycardia. Next step?

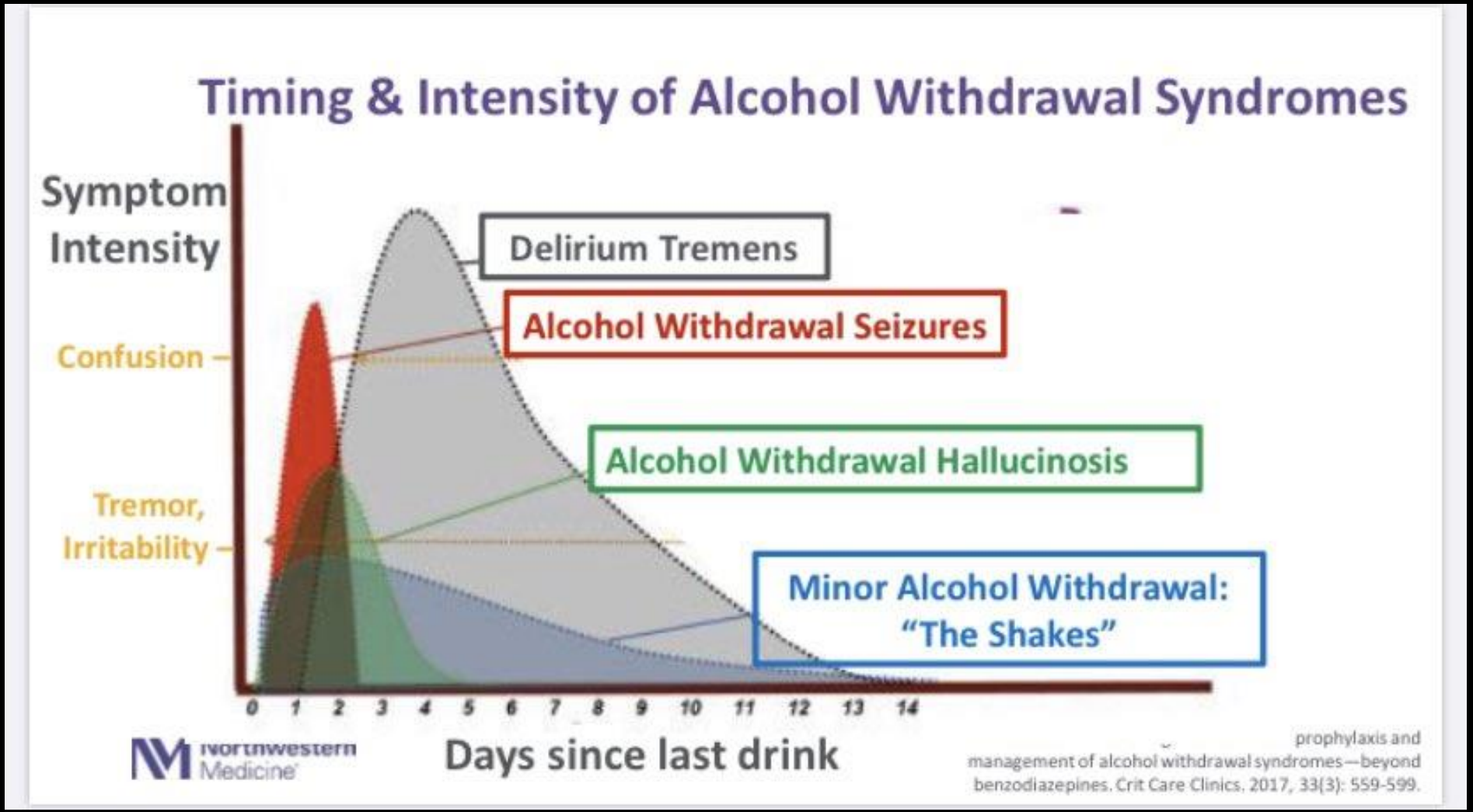
IV lorazepam

Dx?

Alcohol withdrawal*

*HIGH YIELD

*Least alcoholic patient on NBME exams


Timing & Intensity of Alcohol Withdrawal Syndromes
Symptom Intensity
Confusion
Tremor, Irritability
Delirium Tremens
Alcohol Withdrawal Seizures
Alcohol Withdrawal Hallucinosis
Minor Alcohol Withdrawal: "The Shakes"
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Days since last drink
Northwestern Medicine
prophylaxis and management of alcohol withdrawal syndromes—beyond benzodiazepines. Crit Care Clinics. 2017, 33(3): 559-599.

https://www.grepmed.com/images/7285/dts-symptoms-diagnosis-deliriumtremens-timeline

Ortho exam (brief)?

Neurovascular bundle

Motor, neuro, vascular!

35-year-old 5 days post op following ORIF femur fracture develops unilateral leg swelling, dyspnea, hypoxemia, acute onset pleuritic chest pain. Next step?

CT angiography (PE)

Should you get a D-dimer?

No

How do we prevent DVT/PE?

Prophylactic anticoagulation, usually LWMH vs DOAC, ASA

What type of surgery highest risk for DVT?

Orthopedic

Virchow's triad?

Blood flow alteration, hypercoagulability, endothelial cell damage

35-year-old 2 hours post op following ORIF femur fracture develops dyspnea, hypoxemia, altered mental status, petechiae over chest. Diagnosis?

Fat embolus

Management?

Supportive

Sign/Symptom
• Petechial Rash (five points) • Diffuse infiltrates on chest x-ray chest (four points) • Hypoxemia (three points) • Fever (one point) • Tachycardia (one point) • Tachypnea (one point) • Confusion (one point)
Score > 5 diagnosis FES

Kwiatt ME, Seamon MJ. Fat embolism syndrome. Int J Crit Illn Inj Sci. 2013 Jan;3(1):64-8. doi: 10.4103/2229-5151.109426. PMID: 23724388; PMCID: PMC3665122.

70 year old postmenopausal female with fragility fracture.

Most likely predisposing diagnosis?

Osteoporosis

Fragility fracture examples?

Femoral neck/intertrochanteric, distal radius, vertebral compression

Modifiable risk factors?

low BMI, low physical activity, low Vit D/Ca intake, alcohol/tobacco

Drugs increasing risk of osteoporosis?

Steroids, heparin, PPIs, aromatase inhibitors, anticonvulsants

How to dx osteoporosis in general population?

Screening DEXA at age 65 -> T scores of < -2.5

Treatment?

Bisphosphonates first line

Denosumab

Ca + Vit D, weight bearing exercise, Raloxifene, HCTZ

Bisphosphonate examples?

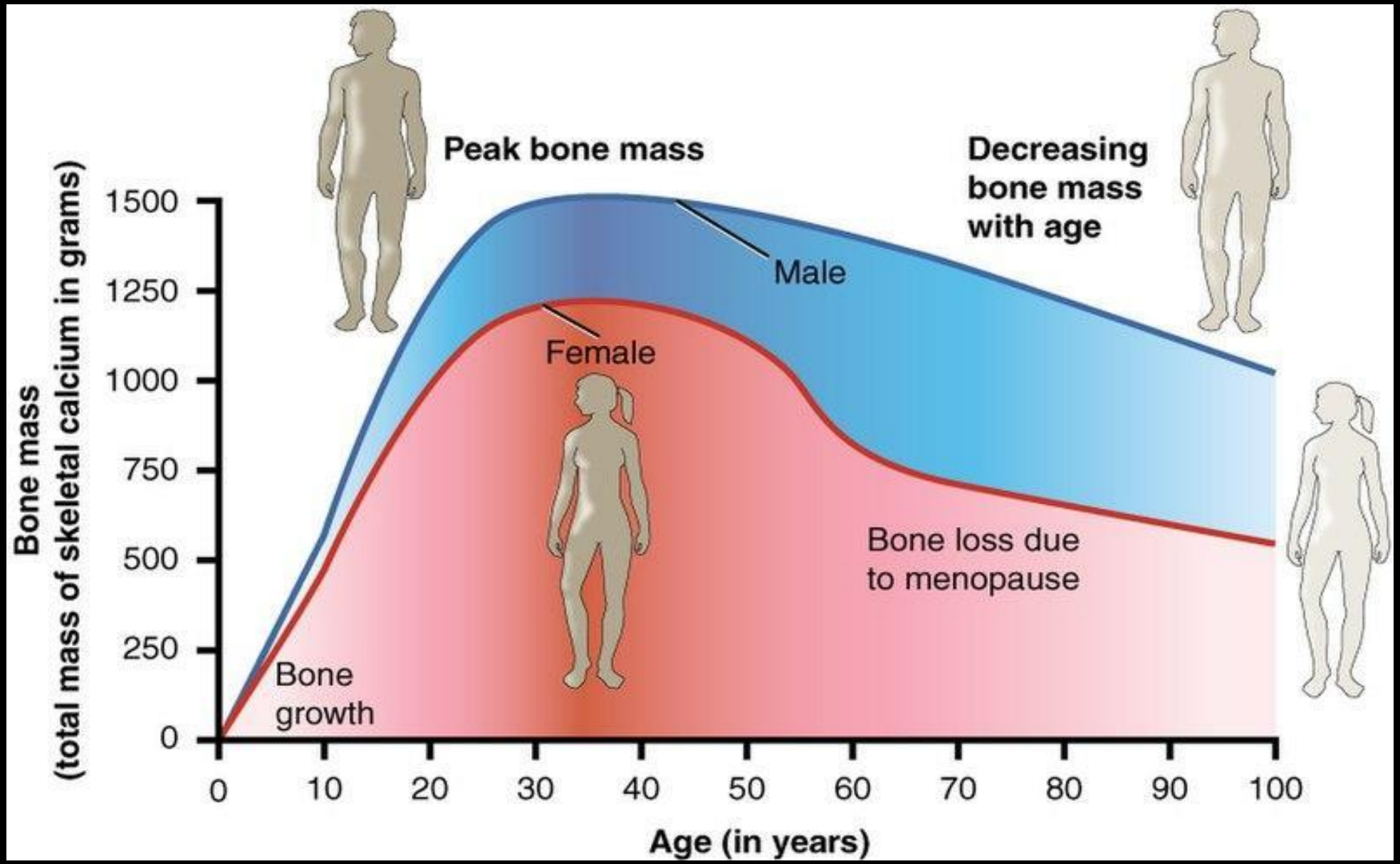
Alendronate, pamidronate, zolendronate

MOA?

Pyrophosphate analog. Decreases osteoclast recruitment/bone resorption and induces osteoclast apoptosis

Adverse effects?

Esophagitis, osteonecrosis of the jaw, hypocalcemia



Anatomy & Physiology, Connexions Web site. http://cnx.org/content/col11496/1.6/, Jun 19, 2013., CC BY 3.0 <https://creativecommons.org/licenses/by/3.0>, via Wikimedia Commons

35-year-old 2 days post op following ORIF tibia fracture suddenly begins to develop extreme pain. On exam you find extreme pain with passive ankle flexion. Diagnosis?

Compartment Syndrome

What should you do next?

Emergent Fasciotomy

Remove constrictions (ie. Casts)

Should you obtain compartment pressures?

NO! Clinical dx

Compartment syndrome pathophys?

Increased tissue perfusion > perfusion pressure

Exam findings?

Early:

Severe pain especially w/ passive stretching!!!

Paresthesia,

Tense swelling

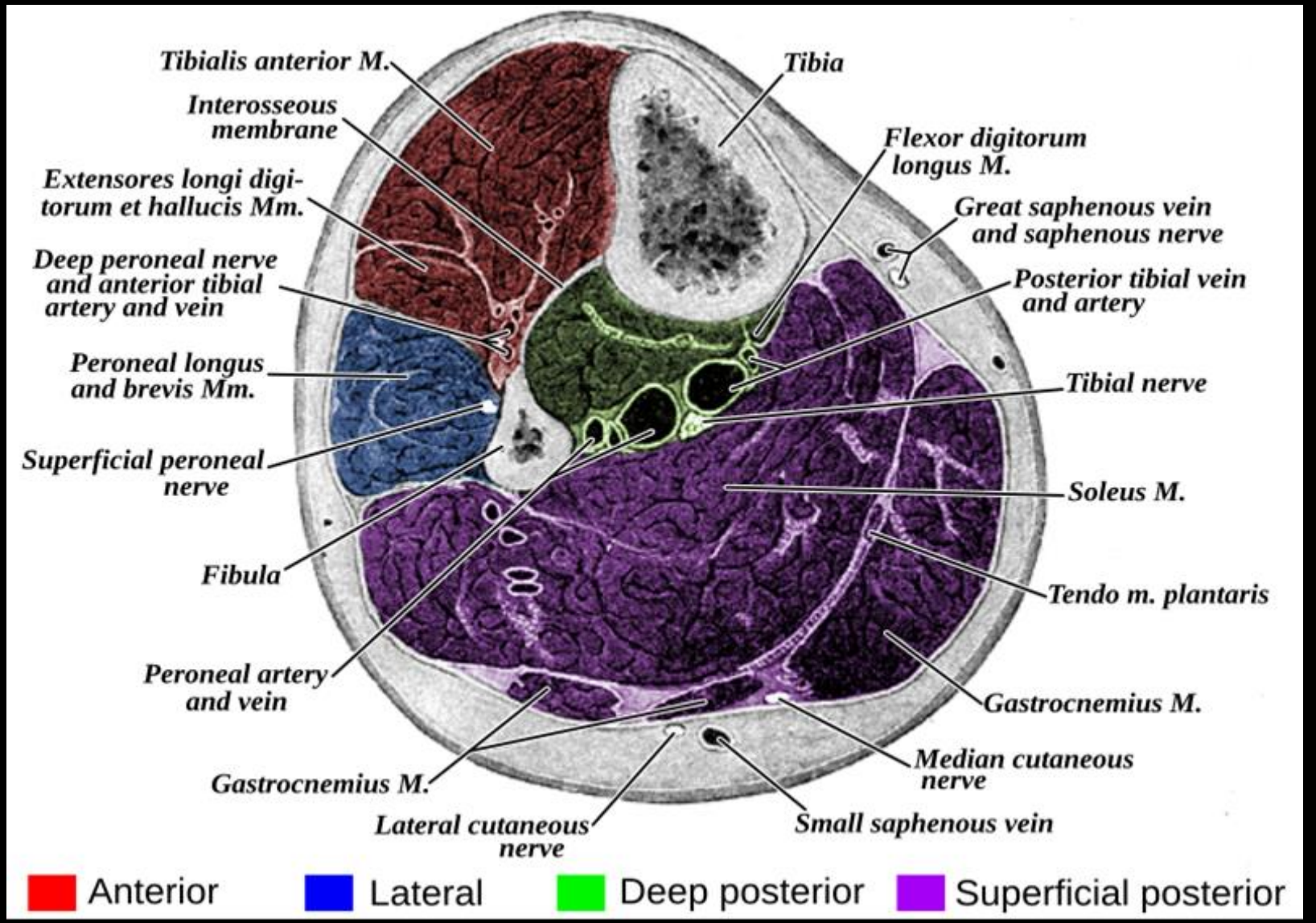
Late (Call your attorney):

Loss of sensation, weakness -> paralysis, loss of pulses

6P's = Pallor, Pain out of proportion, Paresthesias, Pulselessness, Poikilothermia (can't regulate body temp), Paralysis (late finding)

Complications?

AKI from rhabdo, irreversible damage after 6-8 hrs.



Henry Vandyke Carter, Public domain, via Wikimedia Commons

Similar presentation-patient with PMH afib presents with acute onset limb pain. Exam-pallor, diminished pulse, weakness, pain with passive ROM. Next step?

Anticoagulation (heparin)

Acute limb ischemia

Cause?

Likely embolus from afib

55 year old M presenting with leg pain after being gunshot wound to leg. Exam: Diffuse bleeding, cool distal extremity, absent distal pulse. Next step?

Surgery

Vascular injury evaluation:

Hard signs-warrants EMERGENT Surgery

Distal limb ischemia

Absent distal pulses

Active hemorrhage or rapidly expanding hematoma

Bruit or thrill at site of injury

Soft signs:

diminished distal pulses

unexplained hypotension

Bony injury

known hemorrhage

neurologic deficits

Next Step if no hard signs present?

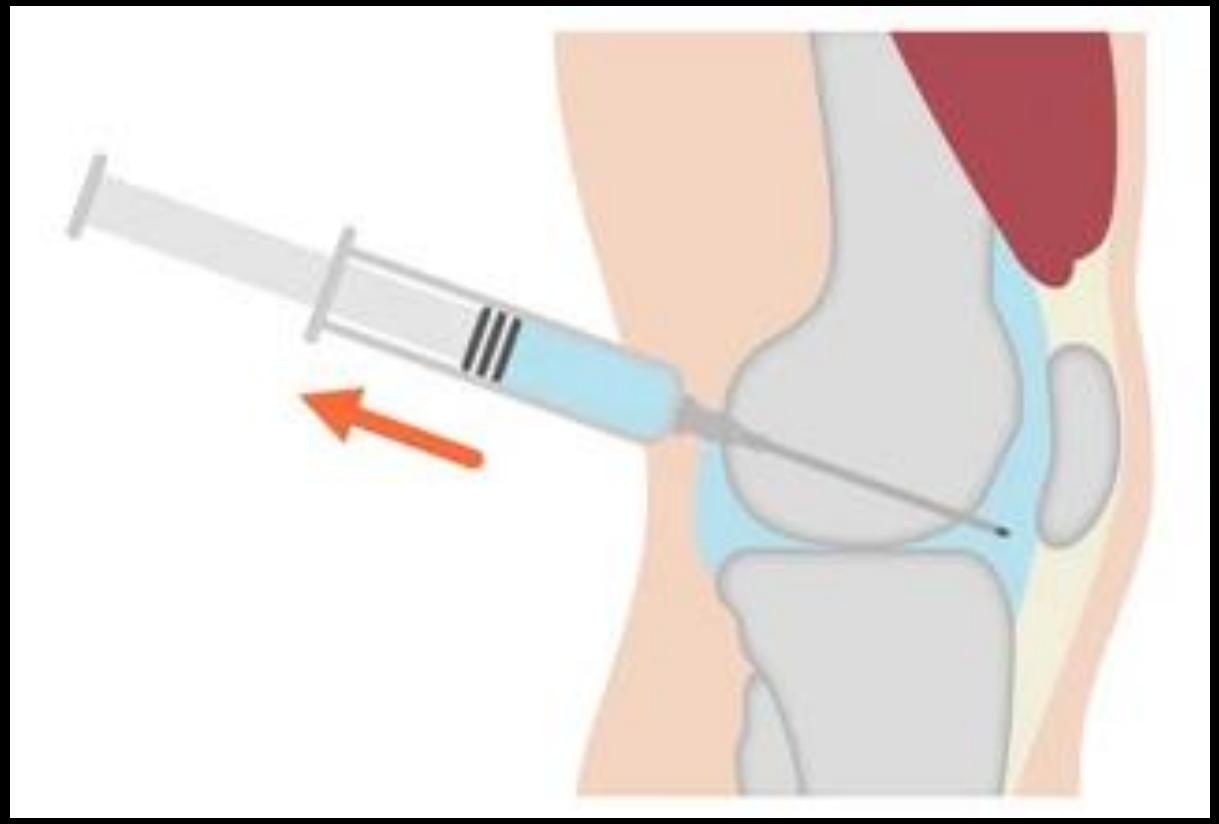
Further imaging (ABI, CT, CT angio, Duplex Doppler)

55 year old M presenting with right knee pain.
Exam: Unilateral knee effusion, warm, red.
Painful with passive and active motion.
Differential diagnosis?

Septic arthritis, gout/pseudogout, RA/OA, hemarthrosis

Next step?

Arthrocentesis



https://www.medmastery.com/guides/emergency-procedures-clinical-guide/when-should-you-consider-arthrocentesis-your-patient

	Normal	Non-inflammatory	Inflammatory	Septic
Appearance	Clear	Clear/straw color	Clear or cloudy	Cloudy
WBC	<200	<2000	>2000	>50,000

Septic Arthritis

Most common bug?

S. Aureus

Other bugs?

GAS, staph epidermidis (prosthetic), less commonly other gram negatives, N. gonorrhea (young)

Risk factors?

Abnormal joint (OA, RA, prosthesis), immunocompromise, bacteremia

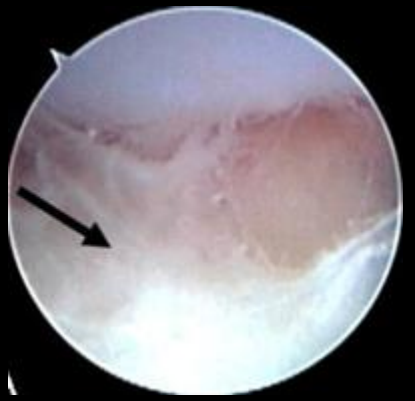
Next step after synovial fluid analysis?

Gram stain and culture

Tx?

Empiric IV antibiotics (vancomycin + ceftriaxone) + joint irrigation/drainage

Synovial fluid in septic arthritis
By James Heilman, MD - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=73507982



Septic arthritis of the ankle in a 3 year old by atrhroscopy
By Tetsuo Hagino, Masanori Wako, Satoshi Ochiai - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3192658/, CC BY 2.5, https://commons.wikimedia.org/w/index.php?curid=61203867

20 yo football player, tackled and falls onto shoulder

Exam: Tender over AC joint. + cross body adduction test. No muscle weakness. Suspected Dx?

AC joint sprain

Dx?

XR

Tx?

Sling, consider surgery if more severe

20 y/o football player, tackled and falls onto shoulder.

Exam: Arm held adducted and ER w/ lateral shoulder numbness.

Axillary nerve injury

Mechanism of injury?

Excessive abduction and ER force

Dx:

Clinical, XR to r/o other injuries

Tx:

Reduction = distal traction and ER of humerus

20 y/o athlete, hit electrical pole and had seizure at the same time. Now with left shoulder pain.
Exam: adducted and internally rotated left arm.
Diagnosis?

Posterior AC subluxation

Shoulder series

AP

Lateral

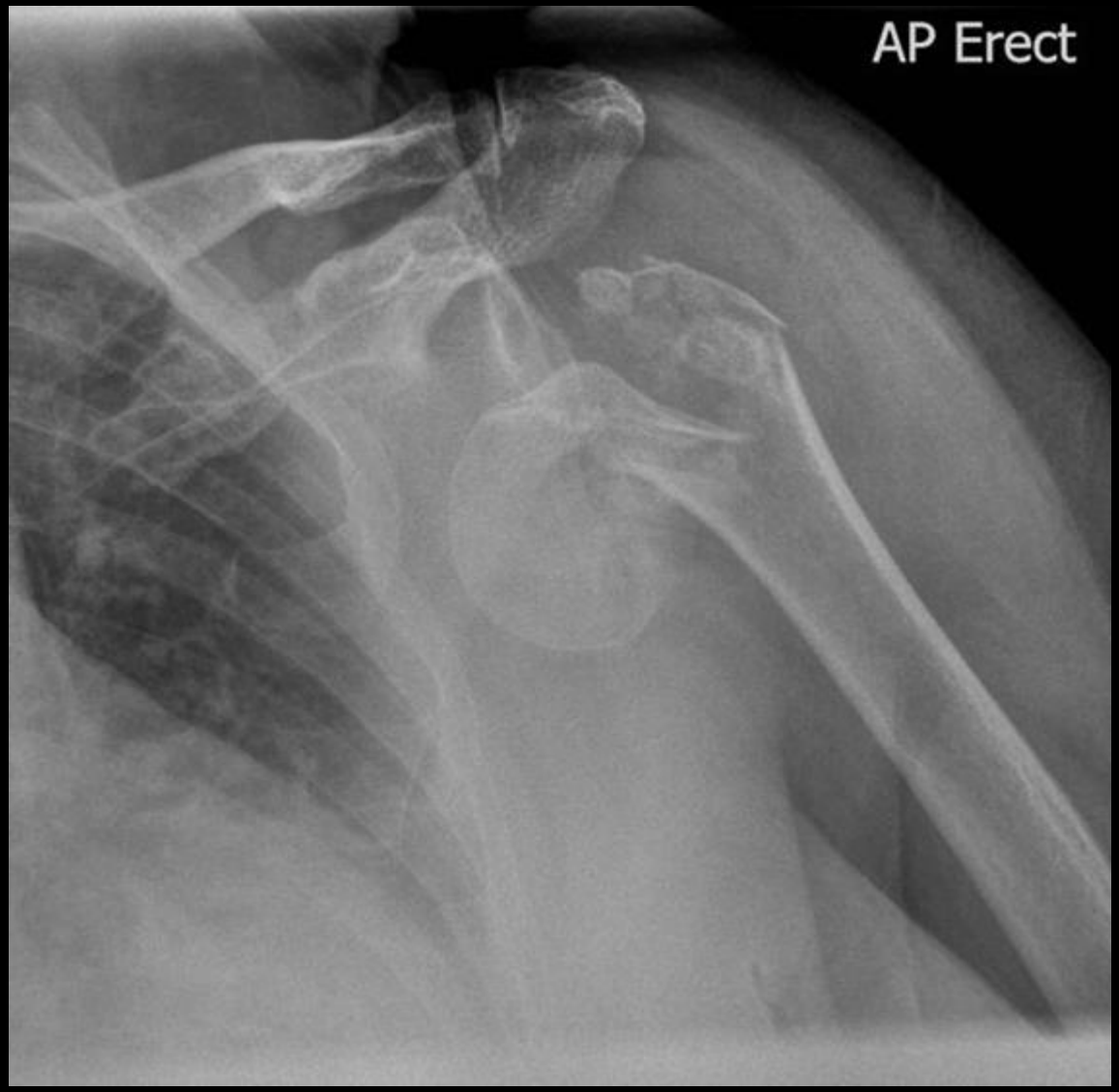
Case courtesy of Dr Craig Hacking rID: 37498

Radiopaedia

Murphy A, Shoulder series. Case study, Radiopaedia.org (Accessed on 22 Sep 2024) https://doi.org/10.53347/rID-72387

20 yo football player, tackled and falls onto shoulder.
Exam: swelling, erythema, tenderness anterior shoulder.
Differential diagnosis?
XR shows clavicular fracture.
Most common location for clavicular fracture?
Middle third
Most common displacement pattern?
Deltoid pulls inferolaterally, SCM pulls superomedially
Treatment?
Sling, surgery if open (skin tenting on exam), neurovascular compromise
Complications?
Subclavian artery and venous injury

Gaillard F, Clavicle fracture. Case study, Radiopaedia.org (Accessed on 22 Sep 2024) https://doi.org/10.53347/rID-18050



Jones J, Humeral neck fracture with humeral head dislocation. Case study, Radiopaedia.org (Accessed on 22 Sep 2024) https://doi.org/10.53347/rID-7386

Humeral neck fracture complications?

May disrupt anterior or posterior circumflex humeral artery, which could lead to AVN

65 year old woman presents after FOOSH now with thumb pain. Exam: tenderness to palpation in anatomic snuff box. Dx?

Scaphoid fracture

Imaging?

XR

If XR is negative?

Repeat in 2-3 weeks if high clinical suspicion

Complications?

AVN + nonunion

Tx?

Thumb spica cast, ORIF if unstable

By JonRichfield - Own work, CC BY-SA 4.0,
https://commons.wikimedia.org/w/index.php?curid=121115115

Postmenopausal woman
FOOSH injury with wrist pain.
XR on screen. Dx?
Distal radius fracture (Colles)
Tx?
Closed reduction followed by immobilization (cast)
ORIF if unstable

Gaillard F, Colles fracture. Case study, Radiopaedia.org (Accessed on 22 Sep 2024) https://doi.org/10.53347/rID-18208

50 y/o F presents with 3 month history of pain and tingling in hand. Exam: numbness in thumb, first 2 digits. + Tinel sign. Works as keyboarder. Dx?

Carpal Tunnel

50 y/o F presents with 3 month history of pain and tingling in hand. Exam: numbness in thumb, first 2 digits. + Tinel sign. Works as keyboarder. Dx?

Carpal Tunnel

Other risk factors:

Pregnancy, RA, hypothyroidism, lunate dislocation, B2 microglobulin deposition

Other features on exam?

Median nerve distribution. Thenar eminence atrophy, weakness of thumb abduction/flexion/opposition, + Tinel/Phalen

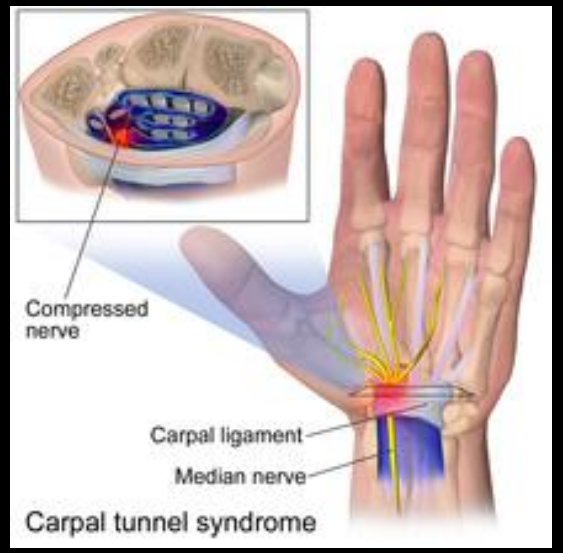
Dx?

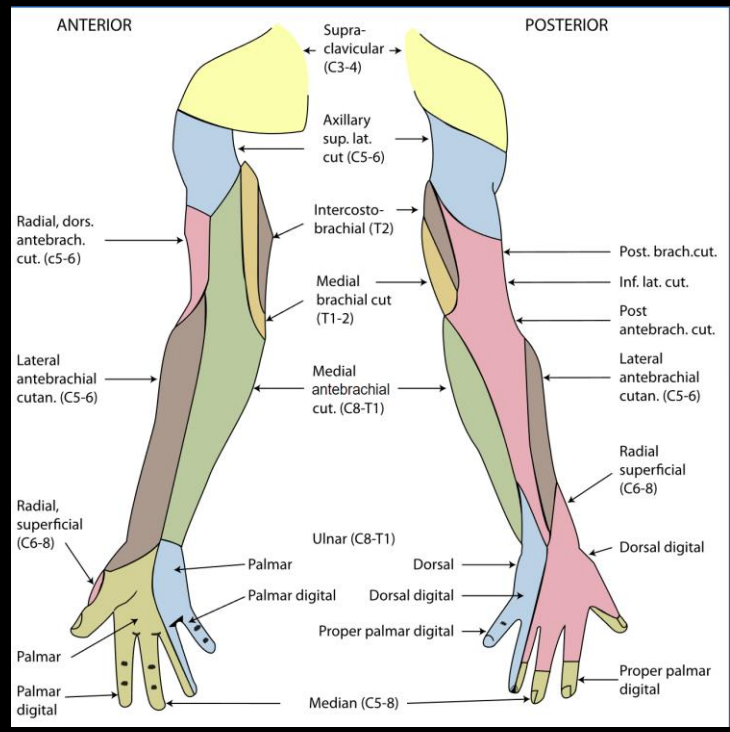
Clinical, nerve conduction studies can aid dx (EMG)

Tx:

Activity modification, splinting first line

Steroid injections, tx underlying cause, carpal tunnel release procedure (Transverse carpal ligament)





Patient with superficial palmar laceration presenting with median claw hand, loss of thenar muscles, but INTACT sensation. Dx?

Injury to the recurrent branch of the median nerve

40 y/o competitive cyclist with pain and paresthesia in 4th and 5th digits. Dx?

Guyon canal syndrome

Cause?

Compression at ulnar wrist

PE?

Sensory loss in ulnar distribution. Hypothenar atrophy. + Tinel sign.

Tx?

Activity modification, bracing, analgesia

Carpenter with repetitive hammer use presents with similar symptoms

Dx?

Cubital tunnel syndrome

Cause?

Ulnar compression at elbow

Forced hyperextension of an actively flexed DIP joint. Pt can flex MCP and PIP, but not DIP. Dx?

Jersey finger

Forced flexion of an actively extended finger at DIP. Pt's finger is flexed when attempting to extend. Dx?

Mallet finger

Nontraumatic progressive pain, clicking, catching and locking of digit. Dx?

Trigger finger

Abscess in pad of finger after penetrating injury. Dx?

Felon

35 year old woman presents following MVA. In severe pain. In trauma bay, exam significant for shortened and IR of hip, held in flexion and adduction. Dx?

Posterior hip dislocation

Next step?

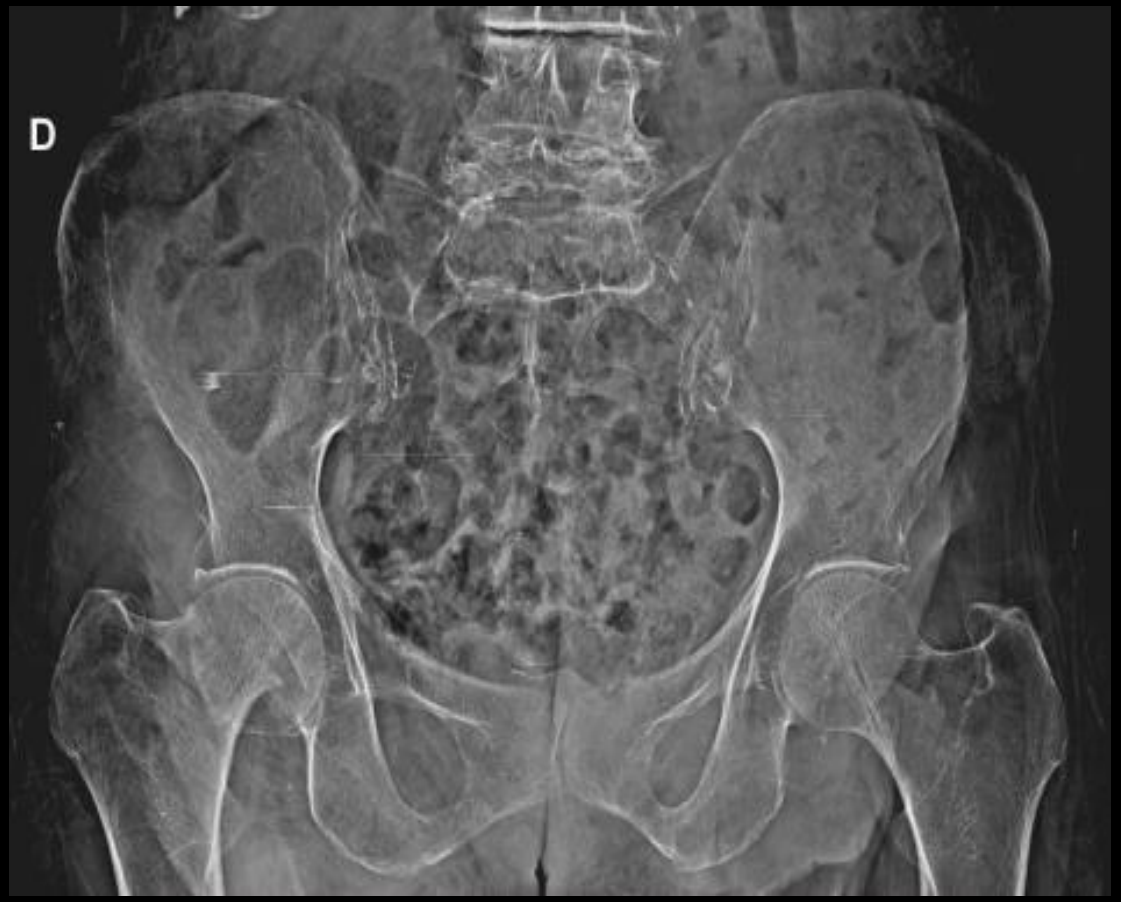
Radiograph

Tx?

Reduction within 6 hrs to reduce risk of AVN

Cx:

Sciatic nerve or inferior gluteal nerve injury, labrum tear, arterial injury



Case courtesy of Ammar Haouimi, Radiopaedia.org, rID: 89370

James Heilman, MD, CC BY-SA 3.0 <https://creativecommons.org/licenses/by-sa/3.0>, via Wikimedia Commons

MVA accident, XR shows posterior knee dislocation. Next step in management?

Vascular exam + ABI + duplex US if available

Next step in management?

Consider Reduction

Why?

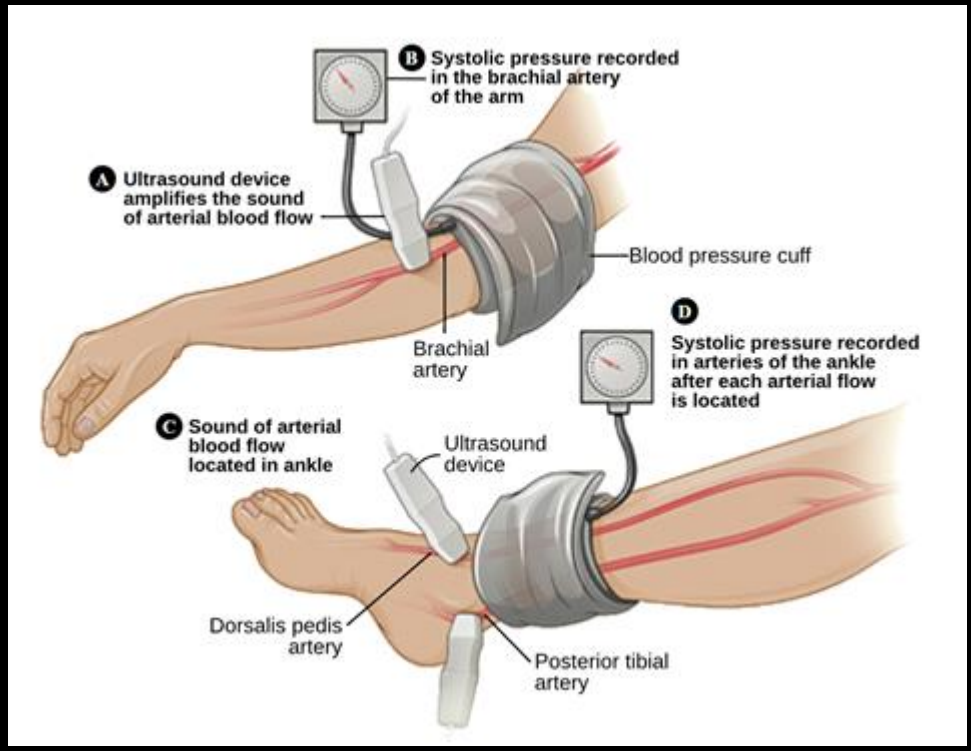
Popliteal artery commonly injured

If ≤ 0.9?

CTA and vascular consult

Other common complication?

Common peroneal nerve injury (lateral fibula)


B Systolic pressure recorded in the brachial artery of the arm
A Ultrasound device amplifies the sound of arterial blood flow
Blood pressure cuff
Brachial artery
D Systolic pressure recorded in arteries of the ankle after each arterial flow is located
C Sound of arterial blood flow located in ankle
Ultrasound device
Dorsalis pedis artery
Posterior tibial artery

Jmarchn, CC BY-SA 3.0 <https://creativecommons.org/licenses/by-sa/3.0>, via Wikimedia Commons

Patient suffers direct blow to anterior knee now presenting with knee pain and limited motion. Exam: Tenderness to palpation of anterior knee, cannot extend knee against gravity. Dx?

Patella fracture

Murphy A, Patella fracture. Case study, Radiopaedia.org (Accessed on 22 Sep 2024) https://doi.org/10.53347/rID-47726

Knee exam maneuvers:

Anterior drawer/Lachman:

ACL

Posterior drawer:

PCL

Valgus laxity:

MCL

Varus laxity:

LCL

IR + varus McMurray:

Lateral meniscus

ER + valgus McMurray:

medial meniscus

Common mechanisms of injury:

Direct blow, sudden deceleration, pivoting/cutting

Dx?

MRI

Tx?

Activity mods, analgesia, surgery

Signs of meniscal tear?

Catching/locking, reduced ROM

Tx?

Conservative if mild w/o impaired activity or older patient, otherwise surgery

Special Fractures

Bending stress causes incomplete fracture partially through width of bone?

Greenstick fracture

Axial force causes simple buckle fracture of cortex

Torus fracture

Spiral fracture in ambulatory children ≤ 3yo 2/2 twisting injury from low impact fall

Toddler's fracture

3 y/o F yanked by arm with elbow pain and holds arm close to body in elbow flexion and pronation

Dx?

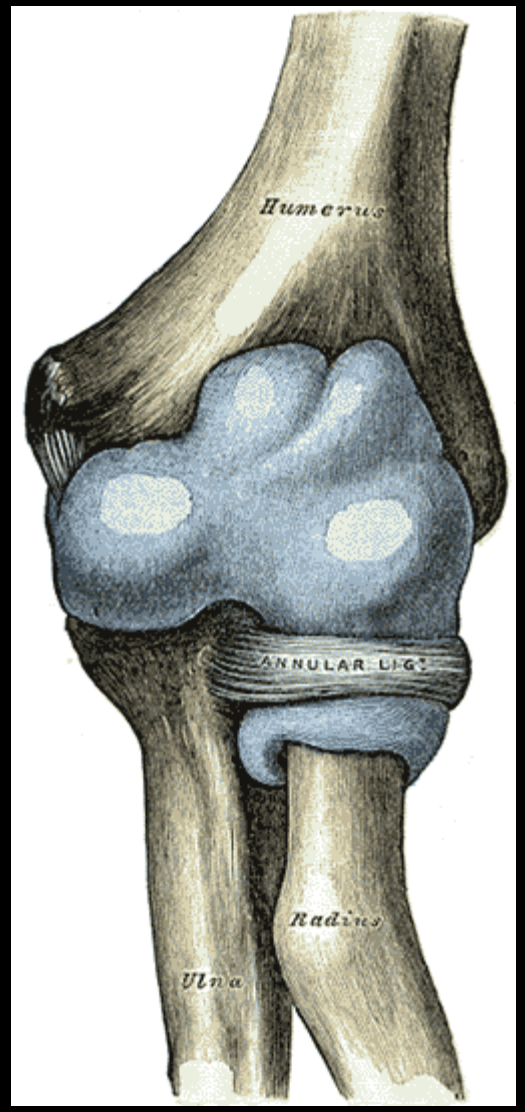
Radial head subluxation

Pathophysiology?

Children <5 have an immature annular ligament prone to injury with traction

Tx?

Reduction with hyperpronation or supination + elbow flexion



By Henry Vandyke Carter - Henry Gray (1918) Anatomy of the Human Body (See "Book" section below)Bartleby.com: Gray's Anatomy, Plate 331, Public Domain, https://commons.wikimedia.org/w/index.php?curid=792116

13

5 y/o presents after FOOSH injury, obvious deformity at distal humerus. VSS. Next step?

Dx?

Supracondylar fracture

HY Complications?

High risk of median nerve and brachial artery (if anteromedial displacement), or radial nerve (if anterolateral displacement) damage

Late complication of brachial artery injury?

Volkmann ischemic contracture

By James Heilman, MD - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=8602687

Fig. 499.—Volkmann's contracture.

By Internet Archive Book Images - https://www.flickr.com/photos/internetarchivebookimages/14756898256/Source book page: https://archive.org/stream/practiceofsurger00mumf/practiceofsurger00mumf#page/n807/mode/1up, No restrictions, https://commons.wikimedia.org/w/index.php?curid=43330345

60 y/o M presents with bone pain, HA and hearing loss that developed in last few months. Dx?

Paget Disease of Bone

Pathogenesis?

Disordered bone remodeling. 3 phases:

Osteoclast/mixed/osteoblast phase

Labs?

High ALP

Tx?

Bisphosphonates + calcitonin

Complications?

Fractures, Predisposes to osteosarcoma

65 y/o M presents with foot pain. Hx DM. Foot XR shown. Dx?

Charcot foot (Charcot neuropathy)

Radswiki T. Case study, Radiopaedia.org (Accessed on 20 Oct 2024) https://doi.org/10.53347/rID-11294

Neurogenic Charcot arthropathy (diabetes mellitus)

Classic Progression:

1. Impaired sensation & joint proprioception
2. Repetitive bone and soft tissue trauma
3. Acute inflammation & hyperemia
4. Bone resorption
5. Bone & ligament destruction (ie. Stress fractures, subluxation, arch collapse)
6. Abnormal weight bearing
7. Foot ulcers
8. Cellulitis, osteomyelitis, amputation

XR:

Osseous fragmentation, new bone formation, subluxation/dislocation in mid/hind foot

Tx?

Foot cast to reduce edema and decrease weight bearing. Orthotics, infectious management, surgical realignment if chronic

Toes stuck in dorsiflexion at the MTP and plantar flexion at the proximal/distal IP joints in a diabetic patient with ill fitting shoes. Dx?

Claw toe deformity

25 year old basketball player presents after hearing ”pop” while playing. Exam: Unable to dorsiflex right foot, Positive Thompson test. Dx?

Achilles rupture

Dx?

Clinical, US or MRI can help

Tx?

Surgical repair

21 year old woman presenting with foot pain. Is a runner. Describes burning pain, numbness ankle, heel, sole , toes. Worse with weight bearing. Exam: + Tinel sign over posterior medial malleolus. Pain worse with dorsiflexion/eversion and plantar flexion/inversion of ankle. Dx?

Tarsal Tunnel Syndrome

Clinical dx, nerve conduction studies help

Tx?

Activity modification, orthotics, analgesia, surgical release if refractory

55 year old woman presenting with 1 week history of acute back pain. Reports pain throughout the day, not improved by rest or position. Has had fevers, chills, night sweats. Now noting some weakness of her left leg. Next steps?

STAT MRI + ESR/CRP

Likely Diagnosis?

Epidural abscess

Treatment?

Surgical debridement (NSGY), IV antibiotics

Commonly confused spinal emergencies

Conus Medullaris – L1

Presentation

- Sudden onset severe back pain
- Perianal hypo/anesthesia
- Symmetric motor weakness
- Hyperreflexia
- Early onset bowel and bladder dysfunction

Dx: MRI

Tx: Tx underlying cause – often surgery

Cauda Equina – L2 and below

Presentation:

- Gradual onset, severe b/l radicular pain
- Saddle anesthesia
- Asymmetric motor weakness
- Hyporeflexia/areflexia
- Late onset bowel and bladder dysfunction

Pathophysiology: commonly 2/2 compressing mass (ie. Malignancy, spinal stenosis, disc herniation)

Dx: MRI

Tx: Steroids, tx underlying cause – often surgery

Fever, chronic insidious back pain, sinus tract formation. Exam: Tenderness to palpation of midline back. No radiculopathy or weakness. Elevated ESR. Dx?

Vertebral osteomyelitis

Risk factors?

Hematogenous seeding (ie. Distant infection, IVDU, IV catheter), contiguous spread, penetrating injury/procedure, immunosuppression, sickle cell

Common bugs:

Staph aureus, coag neg staph, Pseudomonas, salmonella.

Dx:

XR may show bone destruction, MRI, biopsy, blood cultures

Tx:

Initiate antibiotics AFTER biopsy

Empiric IV vanco + anti-pseudomonal, drainage of associated abscesses

Postmenopausal patient with focal back tenderness, pain with bending/coughing/sneezing/lifting. Exam: Focal tenderness, no focal neurological deficits. Dx?

Vertebral compression fracture

Predisposing factor?

Osteoporosis

Treatment?

Pain relief, activity modification

Intranasal calcitonin can reduce pain in acute setting

Older patient, hx of cancer, back pain worse at night and unrelieved by rest. Dx?

Metastatic cancer

55 year old woman presenting with low back pain. Describes with paresthesia and weakness in leg. Exam: positive straight leg test. No fever, chills. Diagnosis?

Herniated disk

Pathophysiology?

Commonly 2/2 posterolateral disc herniation of nucleus pulposus through annulus fibrosis. (Thin posterior longitudinal ligament). Also degenerative spondylosis, malignancy, epidural abscess

Dx?

Clinical. MRI useful if b/l symptoms, bladder/bowel dysfunction, saddle anesthesia, suspected malignancy/abscess

Tx?

Activity modification, NSAID trial, PT, steroid injections, nerve blocks

If pain still present 4-6 weeks later?

MRI to assess for surgery

What muscle injury can present similarly?

* Piriformis syndrome: hypertrophy or injury can compress sciatic nerve

Patient presents with radicular arm pain with sensorimotor defects across multiple nerves.

Dx?

Cervical spondylosis

Imaging?

XR with degenerative changes, osteophytes, MRI

Tx?

Analgesia, surgery

65 y/o M with low back pain radiating to buttocks and thighs exacerbated by walking. Relief when leaning on shopping cart. Tingling and numbness b/l lower extremities. Normal neurologic exam. Dx?

Lumbar spinal stenosis

Pathophysiology?

Commonly 2/2 narrowing of the spinal canal 2/2 intervertebral disc degeneration -> higher load on posterior spine -> facet joint osteophytes and ligamentum flavum hypertrophy

Imaging?

MRI

Tx?

Exercise, PT, surgery if refractory

Adolescent male with proximal femur pain, worse at night, improves with NSAIDs, unrelated to activity. Likely diagnosis?

Osteoid Osteoma

XR?

Small round lucency

Tx:

NSAIDs, monitor for resolution

Patient with pelvis or long bone diaphysis pain and swelling, worse with activity, does NOT respond to NSAIDs. +Fever/chills/night sweats. Diagnosis?

Ewing Sarcoma

XR findings?

Extensive bony involvement with onion skinning 2/2 new subperiosteal bone formation. “Moth eaten” appearance with extension into soft tissue

Chronic localized pain and soft tissue mass at metaphysis of long bone. Fever, chills , night sweats. History of radiation. Likely diagnosis?

Osteosarcoma

Associated with?

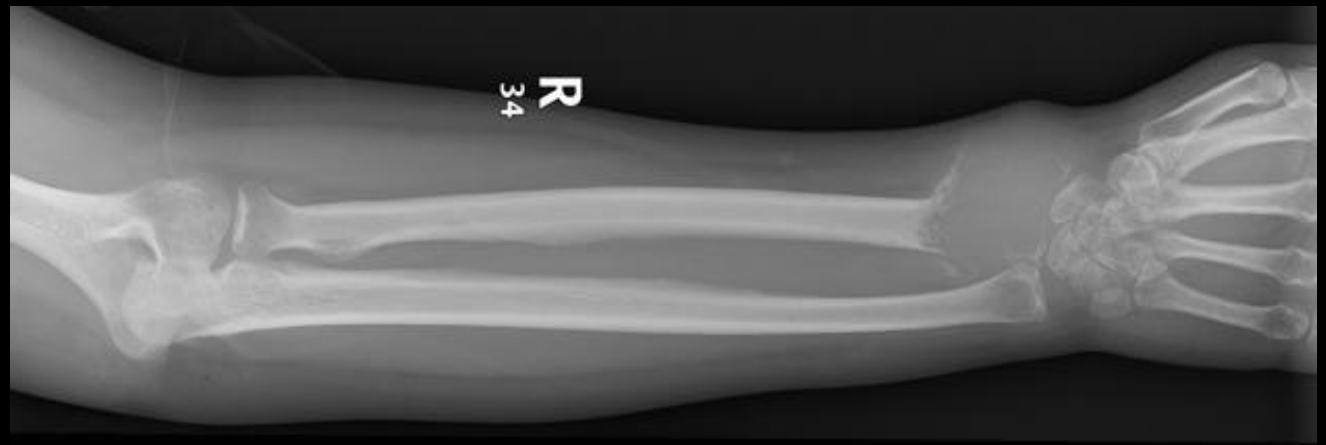
Rb/P53 gene mutations; Paget disease, radiation

XR findings?

Bony destruction with sunburst pattern of periosteal reaction (ie. Spicules of ossified fibers) and/or Codman triangle (raised edge of ossified periosteum).

30 y/o M with pain, swelling, stiffness in right forearm. XR findings below. Diagnosis?

Giant Cell Tumor of Bone



Al Salam H. Case study, Radiopaedia.org (Accessed on 20 Oct 2024)
https://doi.org/10.53347/rID-14256

Giant Cell Tumor of Bone

Imaging Findings?

Eccentric lytic lesions with soap bubble appearance at the epiphysis of long bones.

Dx?

Biopsy w/ multinucleated giant cells

Tx?

Surgery, denosumab can shrink tumors

Locally aggressive, high rate of recurrence

Thanks for watching!

By Mike, Quinn, Jackson

strudelreview@gmail.com